Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

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Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada.....$6.00 a year
Foreign Edition, London.....£1 12s. ($8.00) a year
Single Copies.....15 cents each

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLVII., No. 4. FRIDAY, JULY 23, 1909.

CONTENTS

The contest for papers on the work of the trainmaster closed July 15. Twenty-seven manuscripts were submitted in competition, five of which came from Pennsylvania, two each from Indiana, Louisiana and Missouri, and one each from Alabama, Arkansas, Colorado, Delaware, Georgia, Iowa, Kansas, Kentucky, Michigan, Montana, New York, North Carolina, Panama, Texas, Virginia and Wyoming. The papers will be submitted to a thoroughly competent committee of award, and the winners will be announced as soon as this committee has had time to form its judgment.

The Pennsylvania Railroad Company's recently-adopted specifications for insulated signal wires and cables follow quite precisely the specifications of the Railway Signal Association, with proper exceptions made to provide for the use of kerite insulation. Exceptions are made to three paragraphs. Paragraph 2 of the Association's specifications requires that the insulation consist of 30 per cent. of rubber and 70 per cent. of mineral matter. Paragraph 9 describes certain physical tests, and paragraph 10 describes certain chemical tests. As to these three paragraphs, the Pennsylvania's specifications say: "When kerite insulation is used the requirements of paragraphs 2, 9 and 10 will be omitted." Without this provision a well known material for insulation would have been excluded. Before the last convention of the Signal Association this situation was made clear in these columns, and at the convention the representatives of the Pennsylvania and other roads protested against such a narrowly defined prescription of constituents and tests as would prevent competition. Although a majority at that convention somewhat hastily voted otherwise, this should not prevent an officer from doing his full duty in specifying, as the Pennsylvania has done, and as others may do, in a way to open to all makers the chance to furnish the best possible materials for signal work. President Vaughan, at the last meeting of the Master Mechanics' Association, secured freer discussion by virtually directing the members to name and discuss proprietary articles, to avoid indirection and be frank. The Railway Signal Association avoids in the specification the mention of a proprietary name and, by indirection, excludes it.

The New York, New Haven & Hartford has put on nine trains from Stamford to Harlem River, with a view to inducing passengers to travel to and from New York city (Manhattan) that way and thus relieve the Grand Central station. These trains leave Stamford at 7:02, 7:25, 8:06, 9:12, 10:10, and 11:14 a. m., and 12:10, 1:13 and 3:13 p. m. Most of them stop at the nine stations between Stamford and New Rochelle, and thence run express over the Harlem River branch; and the time through is about one hour. At Harlem River station connection is made with trains of the Third Avenue Elevated for South Ferry, and these start from the New Haven platform. The eastbound trains are arranged in about the same way, the last one at night leaving Harlem River 6:14. No baggage is carried on any of these new trains. From Stamford there is little or no advantage in time by the new trains, as Stamford has numerous express trains to the Grand Central station. From stations between Stamford and the branch there is an advantage of a few minutes to the upper part of Manhattan (125th street) but probably none to points as far south as 42d street, except when connection is made with an express train on the elevated road, which is only during the rush hours. Many persons going to places in lower Manhattan near Third Avenue Elevated stations will probably find a considerable advantage in the easy transfer from train to train at Harlem River, for the suburban trains of the New Haven which go to the Grand Central station now land their passengers in the temporary station where they must execute a "trek" of three to six minutes to reach 42d street; and the trek is largely up hill, the temporary station being below the grade of the street. If the passenger lands in the lowest level he climbs the equivalent of about three flights of stairs—mostly by inclined planes, however, as there is a system of ramps.

Our monthly train accident records have been characterized by a gratifying brevity now for several months and the list for June, printed on another page, is no exception. Indeed, the collisions and derailments in which persons are killed have become so comparatively infrequent that we have modified our exclusion rule to the extent of including in the list passenger train accidents, which are notable locally even when all the personal injuries are reported as non fatal. Besides the brevity of the lists it is noticeable that for seven months now the collisions have been less numerous than the derailments. This would seem to indicate that at last the use of the block

system has become sufficiently general on our most important roads to make the change in the collision record visible to the naked eye; for in former years the number of collisions was almost sure to be greater than that of derailments. For the 12 months of the year 1903 we recorded 378 collisions and 269 derailments, and in only one month of that year, September, was the derailment list the longer. This comparison is only an indication, of course, for our reports are unofficial and mostly based on newspaper reports; and the magnitude of an accident—which is the feature that decides whether or not we record it—cannot always be correctly determined. The government accident records do not indicate this change in so pronounced a manner, yet their evidence is quite marked, as will be seen from the following figures:

I. C. C. Records of Collisions and Derailments.

	Collisions			Derailments		
Quarter ending	No.	Damage.	Killed.	No.	Damage.	Killed.
March 31, 1903...	1,650	$1,486,513	211	1,181	$1,004,533	75
June 30, 1903....	1,403	1,377,453	144	1,202	1,100,206	72
Sept. 30, 1903....	1,765	1,464,319	158	1,298	1,120,029	102
Dec. 31, 1903....	1,830	1,491,349	262	1,179	1,035,651	157
June 30, 1907....	1,806	1,331,244	103	1,971	1,901,429	124
Sept. 30, 1907...	2,245	1,765,541	196	2,034	1,840,155	113
Dec. 31, 1907....	2,094	1,536,723	119	1,870	1,425,747	78
March 31, 1908...	1,190	786,280	62	1,442	1,191,139	52
June 30, 1908....	820	536,973	34	1,310	1,080,425	70
Sept. 30, 1908...	1,170	772,324	101	1,397	1,178,084	75
Dec. 31, 1908....	1,373	1,029,849	116	1,311	910,284	57
March 31, 1909...	1,042	772,222	101	1,242	1,074,980	62

In 1903 the collision record is decidedly larger than the derailment record both in the number of accidents and the number of persons killed; in the last two years the change in the ratio is marked, as regards the number of accidents, though not so much in the number of fatalities; and in the quarter ending June 30, 1908, the excess under the head of derailments is large in all three columns. It is generally agreed, no doubt, that so far as what may be called big accidents are concerned, a considerable percentage of those in the derailment column would be classed by a court as unpreventable, whereas the collision record would not receive any such merciful treatment. It is to be borne in mind that the money loss in the Interstate Commerce Commission record represents only the damage to cars, engines and roadway, and does not include payments for loss of life or limb, or damage to freight; also that those records include all accidents, down to those costing only $150. Thus are included many collisions which are not directly preventable by the block system and many lesser derailments which probably are curable only by a great stiffening of discipline.

We have made these comparisons of records because of the presence of a disastrous collision in our June record. This collision, however, is in what may be called the postscript of our article: the note on street railway accidents. The steam railways, after 75 years' experience, are beginning to purge themselves of this collision disgrace, but the electric lines are calmly taking the older lines' place. They not only fail to learn from the costly experience of the last 50 years, all plain before them, but they make the horrors worse by carrying nearly or quite all their passengers in the front vehicle of the train—and usually in the front end of that vehicle. Some people have hoped that Congress would stimulate the activity of the railway in adopting the block system by passing a law on the subject; but when interurban lines are considered it is to be remembered that some of those lines do no interstate business whatever, and therefore are not amenable to Federal laws. This Indiana line, however, not only extends into Illinois, and thus is subject to Congressional action, but mostly in a state (Indiana) which has already passed a law requiring the use of the block system. Unfortunately, however, the Indiana law is not very intelligently framed nor very vigorously applied, so that we have the death record which we print to-day, notwithstanding the laudable purposes of the legislators and the officers of the state. Indiana has made a start, while Congress has not, but thus far the results are no better in the one case than in the other.

COAL SUPPLY IN THE SOUTH.

In our description of the Carolina, Clinchfield & Ohio, published March 19, page 539, we commented on the present situation with regard to the coal supply in the southern Atlantic coast states—North Carolina, South Carolina and Georgia. We pointed out at that time that all the commercial bituminous coal lies to the west of the easternmost range of the Appalachian chain of mountains, extending in a general northeasterly and southwesterly direction from Pennsylvania into Alabama, and that, in order to get coal into these coast states, it had been necessary either to haul it by way of roundabout passes or to get it around the mountains. One line of railway—the Morristown-Asheville line of the Southern—has heretofore been the only commercial route for coal between the Virginia border and the southern end of the great Smoky mountains, in the state of Georgia, where the Atlanta, Knoxville & Northern (Louisville & Nashville) makes a V, the line running south from Knoxville connecting with the line running northeast to a junction with the Southern Railway at Murphy, N. C.

The Southern Railway can supply coal to the central part of its system over the Morristown-Asheville grade, although a 5 per cent. grade makes too steep a hill to handle coal trains on economically. The Atlantic Coast Line has to haul its coal materially longer distances, but is enabled to profit indirectly by the fact that much of the haul is over the lines of the Louisville & Nashville, and a gain for the proprietary road is an indirect gain for the Coast Line. All coal used by the Atlantic Coast Line from Savannah north is now purchased in the Virginia fields, along the lines of the Chesapeake & Ohio and Norfolk & Western. Coal for that part of the system located in Alabama and in Georgia, south of Savannah, is bought in the Birmingham district, while coal for Florida comes from the Tennessee district. That is to say, the Florida coal has to be hauled from Nashville to Montgomery before it gets on the Coast Line at all. But the intervening mileage is all proprietary, controlled through stock ownership.

The Seaboard Air Line has had the least fortunate situation of all. Except for its extension into Atlanta and Birmingham—a branch quite remote from the southern part of the system—it had no coal of its own, no proprietary line in coal country, and no short cut across the mountains; while it has been sufficiently well understood by all parties that if the Southern Railway was to keep out of Seaboard territory, the Seaboard must keep out of the hills. The construction of the Carolina, Clinchfield & Ohio, however, gave it coal at a point where it needed it very much, while the completion of the Virginian Railway gave a new competitive supply on the north. At present the Seaboard receives its fuel coal as follows:

For use between Richmond and Portsmouth, Va., and Raleigh, N. C., from the Virginian Railway via Algren and Alberta, Va.

For use between Abbeville, S. C.; Rutherfordton, N. C.; Hamlet, N. C.; Wilmington, N. C., and Denmark, S. C., from the Clinchfield railway through Bostic, N. C.

For use in territory south of Savannah, Ga., from the Southern Railway through Everett, Ga.

For use between Montgomery, Ala., and Savannah, Ga., from the Louisville & Nashville Railroad through Montgomery, Ala.

For use between Atlanta, Ga., and Abbeville, S. C., from the Nashville, Chattanooga & St. Louis Railway through Atlanta, Ga.

For use between Birmingham, Ala., and Atlanta, Ga., from the St. Louis & San Francisco through Birmingham, Ala.

The Georgia Central also has a long haul for its fuel coal. At the present time all its coal supply except 200 tons per working day is drawn from the Alabama mines, coming in at Birmingham and Montgomery. The 200 tons referred to are used on the Chattanooga division, and come in from Tennessee territory. It is 448 miles, however, from Birmingham to Savannah, and approximately 450 from Chattanooga to

Savannah—a long distance for the coal used on the eastern part of the line to travel.

At present the Clinchfield road is not operating trains south of Bostic. It is planned to continue the road south to Spartanburg, S. C., where connection is made with the Southern Railway and with the Charleston & Western Carolina, affiliated with the Atlantic Coast Line. When this is done another change will be made in the source of coal supply for this part of the South. Meantime the Atlanta, Birmingham & Atlantic is sure before long to be reorganized, and to be operated efficiently as a coal carrier from the heart of the Alabama district to the heart of the district where bituminous coal is scarcest; while, on the north, the Virginian Railway, closely paralleling the Norfolk & Western and drawing from the same territory, will be apt to look for a different market from its rival. It seems not unlikely that this market may lie in the South instead of the North. At all events, it is going to be a good deal easier to get coal into the South Atlantic states than it ever has been before, and tne development of this territory may be expected to be benefited accordingly.

THE NEW TOOL STEEL.

In writing of tool steels it seems necessary to make some definite classification of the various kinds which have been used for the cutting edges of those used in machine tools. F. W. Taylor has grouped them historically under three main heads: (1) The carbon tool steels; era, up to 1894. (2) The Mushet or self-hardening tool steels; era, 1894 to 1900. (3) High speed steels; era, 1900 to 1909. The first group includes steels which exhibit a maximum hardness at ordinary temperatures, and soften at 200 deg. C. Group 2 represents carbon steel with the addition of tungsten which enables it to be used at higher temperature up to 400 deg. C. Group 3 includes steels which after heat treatment do not exhibit maximum hardness at ordinary temperatures. In virtue more particularly of their chromium content, they possess maximum cutting hardness at 600 deg. C. to 650 deg. C.

During 1908 a further improvement was made in tool steels which enables them to be used at still higher temperatures, and gives them remarkable endurance. This steel has been called "high duty" steel. The great reforms which have been effected in machine shop practice since the introduction of high speed steel have been so surprising that little further gain in general efficiency has been expected; but the steel makers have demonstrated that they had by no means reached the limit of possibility in making a high grade metal for cutting tools, and the machine tool makers have just begun to realize in regular standard construction the necessities placed on them by the remarkable qualities of the new steels.

Machine tools which are adequate to the maximum requirements of good high speed steel will answer well for the new high duty steel, as the new steel is not worked at a higher pressure but at a higher velocity, and the principal change will be in the production of high speed machine tools. In high speed drills and drilling machines the progress which has been made is such as to make the record appear little short of marvelous. Thus, 1⅛ in. holes have been drilled in cast iron with vertical feed of 29 in. per minute, and $\frac{15}{16}$ in. holes were drilled in machinery steel at the rate of 13 lineal in. per minute. It is found that with a constant feed there is a decrease in the pressure required on the end of the spindle as the speed increases beyond a certain rate, and for a certain feed 250 r.p.m. is more efficient than 200 r.p.m. By the use of roller bearings in the spindle thrust block drill presses are operated under heavy pressure at 400 to 500 r.p.m. A $\frac{15}{16}$-in. twist drill made of high duty steel has been operated at 592 r.p.m. with a feed of 20½ in. per minute.

For turning and boring steel tires, turning axles, planing and slotting frames, and slabbing rod forgings, the railways can use to advantage the moderate priced high speed steels, and as these are being rapidly improved they call for increased power, and, consequently, greater strength and weight in the machine tools. The tool steel sensation in England appears to relate to a remarkable improvement in the endurance of the tool, and not so much to any quality which makes higher cutting speeds possible. The net result is equivalent to a reduction in the price per pound, and some saving in time required in repeated tool grinding. For example, the improved steel will turn out nine locomotive tires without regrinding while ordinary high speed steel will turn out but two. The actual weight of cuttings with the new steel in other tests is 5 times that of the ordinary high speed steel for one grinding. The new steel is of special value on hard cast iron and hard steel.

An English engineering paper says there is absolutely nothing in the nature of a revolution in these high duty steels. They are produced by a natural process of development from what has gone before, using the same alloys, but in different proportions. An eminent steel maker has put the matter very effectively by saying that the claims for the new steel remind him of the man who discovered a new drink. It turned out to be whiskey and soda, but with twice the usual amount of whiskey. A curious commercial condition has arisen in connection with this high duty steel. This is that they have such a wonderful endurance that there is less worn out and hence less demand in pounds from the manufacturer, and consequently manufacturers are hesitating to push improvements to the highest possibilities. It is true the brands having highest efficiency are sold at a prohibitive price, but enough has been accomplished to supply the railways with a tool steel at moderate price which will be so generally used that only the strongest machines now made will be equal to the heavy cuts which this steel makes possible.

It is probable also that for years to come the standard grade of high speed steels, with such improvements as the makers are making without increase in price, will hold the field for general work against the very expensive special brands. Those who need special steels for unusual conditions can have them by paying a special price.

THE VALUE OF THE RAILWAY LIEN.

Judge Sanborn, of the United States Circuit Court, has given four weeks' notice of the sale of the properties of the Chicago Great Western Company under somewhat peculiar, not to say unique, conditions. The bankrupt corporation has no mortgage upon its property or franchises, its liability consisting of debentures—which may practically be called its notes of hand—and three classes of stocks, two of the classes preferred. Note holders and general creditors of the company have obtained a judgment for $10,653,414, and the upset price fixed at the coming auction is $12,000,000, or enough to cover the aggregate judgment and somewhat more. It will be seen that in practical features the processes and results of a regular mortgage foreclosure follow, ending probably in some kind of a reorganization. In the absence of a mortgage an outside lien, or more strictly speaking, an outside lien in form, has been the legal and judicial equivalent to a mortgage security. The creditors get the property as completely as though they were foreclosing a senior mortgage, though probably not with the same equity as security for their investment or advances, as the case may be. They are essentially, once the judgment has been obtained, mortgagees and secured, as far as the court can secure them, by the upset price fixed by the judge.

This uncommon case is noteworthy in several directions. There's a kind of divinity that doth hedge about the term "mortgage," whether the word applies to a railway or other property. It is a word that is a kind of spell to charm the conservative investor, a word that paraphrases itself readily into "security," a word that the state recognizes and accents when it defines legal holdings for savings banks and trustees.

Yet, at bottom, it is a term of values most varied and uncertain. It *does* mean a legal lien. But beyond that the term may mean much, little or nothing. It has all degrees of priority running up now and then, even in the case of railways, to third, fourth or fifth mortgage. It may be a "consolidated" first mortgage, into which other mortgages may be refunded, yet with that adjective a misnomer in fact when there are several other underlying mortgage liens. It may be an "open" mortgage with elastic extension, or it may be a "closed" mortgage which cannot be dilated by added issues of the same class of bonds. It may be a "first" and also a "closed" mortgage, yet bad, perhaps worthless, security, of a railway corporation not earning operating expense, while at the same time the note of hand of a strong railway corporation is gilt-edged. In the railway mortgage, as in the case of stock, there are just two investment questions: (1) What are the actual net earnings of the company, and (2) will or will not those earnings continue? The speculator, or, maybe, a railway corporation seeking control, may ask other questions; the conservative investor almost never.

The Chicago Great Western case brings home with peculiar clearness another variation in the railway lien showing how it rests on the ultimate security rather than upon form. It is a trite thing to say that the long debenture or short note of the big dividend paying railway ranks usually far higher in security than the senior mortgage of the non-dividend line. Yet few investors fully appraise the fact. They dwell upon the noun "mortgage" as a kind of fetich. They forget that in such a case the "judgment," in the well-nigh impossible case of a default, practically equates the mortgage and its foreclosure forever. Above all they are prone to overlook, in the case of the big line or system which is also a regular dividend payer, what may be called the sentimental equities. These consist in the traditions of the company; the responsibility of the managers and directors to an expectant host of stockholders; and that obligation of the dividend earned, which carries with it the high credit that economizes future financing. "High finance" may, of course, strike in, and there are instances where it has overtaken railway corporations which had been reckoned conservative. But in how many such cases has it hit railway corporations with stockholdings widely distributed, in how many cases where the lethargic stockholder has not been himself to blame and, and in how many cases has it really hit the holder of any security underlying the stock? Yet so potent is the "mortgage" in investment psychology—even allowing for the institutional investment under the restraints of law—that it often is measured by one per cent. in the annual interest return. The mortgage bond of the steady dividend payer, that is to say, sells on a basis often one per cent. less than the note secured by the judgment of the Chicago Great Western type, notwithstanding the great equities, material and sentimental.

There is a final and broader suggestion in the Chicago Great Western case where a decree of the court has carried with it practical mortgage powers, when there has been no mortgage. The best of the negotiators of realty liens tell us that they look carefully into the character of the mortgagor. Is there not in railway financing the same test where the high character of the record, the *quality* of the corporation, even if proverbially without a soul, counts and counts much? In the liens of such a railway company the property and earning power which the liens cover may be prime, but corporation character comes in—or should come in—as a close second.

NEW PUBLICATIONS.

American Street Railway Investments. Issued annually in connection with the *Electric Railway Journal*; edition of 1909. Published by the McGraw Publishing Co., New York. 500 pages; 9 x 13 in.; cloth. Price, $5.

The Electric Railway Red Book appears in its usual form, with the addition of some maps not previously published. This book is one of the important standard statistical works in the street railway field, giving, as it does, the physical and financial statistics of substantially every traction property in the United States and Canada. It is interesting to note in the volume at hand that for the year 1908 there were ten companies in the country which earned over $10,000,000 gross each, the New York Interborough Rapid Transit Company, with 25 millions, heading the list, followed by the Brooklyn Rapid Transit with 18½ millions, and the Stone & Webster organization in Boston, with 17⅓ millions. In all, there were 92 companies in 1908 which earned one million dollars or over. It is noteworthy throughout the list that the street railways, as a group, felt the hard times much less than the steam railways did. The results are not totaled because they are not strictly comparable, owing to the omission of certain companies in one year or the other, and to some changes in grouping and in forms of accounting. But it is apparent that the lines, as a whole, earned more in 1908 than they did in 1907.

Graphic Problems of Railway Traction. By Pietro Opizzi, M.E.. 204 pages; 51 illustrations. Published by Ulrico Hoeli, Milan, Italy; 1909.

Mr. Opizzi is a well-known Italian railway expert, who has published what may be described as an annotated collection of diagrams or charts, to be used in solving various problems connected with railway construction and operation. These diagrams range all the way from the compilation of train schedules to records of service, cost accounting and fuel consumption. The author has a chapter dealing with train resistance, and discusses at some length the question of speed variations and acceleration in starting. A special chapter deals with the action of brakes, which is illustrated graphically, and the book closes with a somewhat condensed discussion of the economics of railway construction and operation. The book, as a whole, is original and contains much information in small space, although it is not likely to be widely used outside of Italy.

Sunrise in the South. By Richard H. Edmonds, Editor of the *Manufacturers' Record.* Reprinted from *Manufacturers' Record,* Baltimore; 1909.

This pamphlet of eight pages, 6 x 9 in., contains a large amount of statistical information about the South, which is of value to those interested in the commerce and transportation of that region.

Contributed Papers.

TRAIN ACCIDENTS IN JUNE.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of June, 1909. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Train Accidents in the United States in June, 1909.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	No. persons reported Kil'd.	Inj'd.
2.	Balt. & Ohio	Mars.	xc.	Ft. & Ft.	2	2
10.	Wh. & Lake E.	Cleveland.	rc.	P. & P.	0	3
19.	M., K. & Tex.	Minco.	bc.	Ft. & Ft.	0	5
†21.	Southern	Belmont, Ill.	bc.	P. & P.	1	25
29.	Wabash	Missouri City.	bc.	P. & Ft.	1	11

[1] Abbreviations and marks used in Accident List: rc, Rear collision——bc, Butting collision——xc, other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of boiler of locomotive on road——fire, Cars burned while running——P., or Pass., passenger train——F., or Ft., freight train (includes empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

Derailments.

Date.	Road.	Place.	Cause of derlmt.	Kind of train.	No. persons reported Kil'd.	Inj'd.
3.	Southern	Maxine.	d. track.	Pass.	0	8
†10.	K. C., Mex. & O.	Knox City, Tex.	wind.	Pass.	1	7
13.	A., T. & S. Fe.	Pecos, Tex.	ms.	Ft.	1	1
16.	Tex. & Pac.	Ranger.	unx.	Ft.	1	2
16.	Erie	Waverly.	unx.	Pass.	0	6
25.	N., O. & W.	Livingston M.	unx.	Pass.	2	4
*25.	Butte County.	Paradise.	d. brakes.	Ft.	2	0
26.	D., L. & W.	Lynhurst.	d. switch.	Ft.	1	0
27.	Erie	Binghamton.	acc. obst.	Ft.	2	1
27.	Den. & Rio. G.	Sedalia.	d. track.	Pass.	0	8

The collision at Mars, Pa., on the second, was on an ascending grade. The leading train, which had an engine pushing at the rear, became stalled as it entered a side track and, although it had two engines, it began running back down the grade. An engine and a caboose following came on just then at too high speed to be stopped before colliding with the engine at the rear of the freight. This engine was facing backward. The persons killed were the engineman and fireman of the light engine. The collision at Belmont, Ill., on the twenty-first, is reported as due to a mistake in despatchers' orders. The person killed was a postal clerk.

The train derailed at Livingston Manor, N. Y., on the twenty-fifth, was westbound passenger train No. 3, and the engine and first two cars fell down a bank. Two passenger cars were derailed, but did not leave the roadbed. The persons killed were the engineman and fireman. The train derailed near Binghamton, N. Y., on the twenty-seventh, was the westbound Wells-Fargo express train. The track of this train was obstructed by a car which had been derailed in an eastbound freight by the breaking of a flange. The engine of the westbound train fell down a bank, followed by two express cars. The derailment at Sedalia, Colo., on the twenty-seventh, is said to have been due to distortion of the track by unusual solar heat. According to the newspapers, another derailment, less serious, occurred near the same place on the same day from the same cause.

Of seven serious electric car accidents reported in the newspapers in June, only one appears to have been immediately fatal, but that one rose to the magnitude of a disaster. One other (Wilmington, Del., on the 24th) was a rear collision which injured forty persons and some of the injuries were reported as fatal. The leading car had stopped because its trolley pole flew off from the wire, and the consequent failure of its light is given as the immediate cause of the collision. One butting collision, near Tamaqua, Pa., on the 30th, was reported as due to failure of "block signals" to work properly. The disaster killing 10 persons outright was a butting collision on the Chicago, Lake Shore & South Bend at Baileytown, Ind., June 19. It was reported in the *Railroad Age Gazette* June 25.

CENSORSHIP OF RAILWAY TELEGRAMS.*

BY J. G. JENNINGS,

Superintendent of Telegraph of the Rock Island Lines.

First.—You must have the active support of your superior officer. Without this very essential aid a censorship system may as well not be started.

Second.—Once started, never let up. If you do, the usual mass of useless and unnecessary stuff, some of which would answer every purpose if sent by train mail, will be offered again within a very short time for transmission by wire.

All telegraph superintendents must realize how difficult it would be to organize and maintain a perfect censorship system unless the principal relay offices are under the direct jurisdiction of the telegraph department. On the Rock Island lines we have managers at practically all of the general superintendents' and division superintendents' headquarters, reporting direct to the head of the telegraph department; and we can keep a pretty accurate check on every message handled on the wires, both through and local.

These managers have instructions to go through their files daily, pick out all telegrams which appear to be unnecessary to be transmitted by wire, and forward them to the superintendent of telegraph. We do, of course, depend in a way upon the managers to properly censor all business handled at their offices, but not entirely so. Every time one of the telegraph department staff is at any of our relay offices he considers it a part of his inspection trip to go through the back files, picking out several days' business at random and see whether or not the managers are following instructions. We have, at times, found cases where a manager may, through a personal friendly feeling towards a division official, suffer from defective eye-sight in sorting out telegrams when he scans those sent by that particular friend of his; but when he knows that one of my assistants or myself may drop in any time to check him up he is pretty apt to keep his eyesight up to standard at all times.

This censorship system is something we watch very closely on the Rock Island, and if we do not receive a bunch of telegrams from each one of our managers at certain intervals we find out the reason.

When these messages are received in my office one of my assistants goes through them carefully, and if in his judgment any of them will pass muster as telegrams they are returned to the manager. The others are sorted and one of our blank forms bearing the facsimile signature of the general manager or second vice-president is filled out, affixed to the telegrams in question and forwarded to the sender for explanation. The blank is signed by the general manager for offenders in the operating department and by the second vice-president for the traffic and other departments. These forms are numbered and written up in duplicate, the original being mailed direct to the official concerned with the telegrams in question, the duplicate being retained in my office; and if, after a reasonable time, the original is not returned we send an urger for it, signed by the general manager or the second vice-president. * * *

We also censor legitimate telegrams as to the number of words and we have saved thousands of unnecessary words being transmitted and the great money maker, Time, which is applied to other important telegrams, making the service highly efficient. It is unnecessary to display any Chesterfield characteristics whatever; the words "please," "kindly," etc., are eliminated.

We have three grades of telegrams, namely, pink, rush and ordinary. The "pink" telegram privilege is confined to the general superintendents and higher officers, and this business is not permitted to even see a "hook," as it is handed direct to the operator on the wire it belongs on and takes preference over other telegrams, and no excuse, other than wire failure, will be accepted for delay in transmission. This being true, we can handle a "pink" telegram from the general office in Chicago to any general superintendent on the great Rock Island Lines within a space of five minutes.

*From a paper read before the Railway Telegraph Superintendents at Detroit, Mich.

THE DOCKETS OF THE INTERSTATE COMMERCE COMMISSION.

BY LOGAN G. M'PHERSON.

In April, 1908, the writer made a classification and summary of the complaints presented to the Interstate Commerce Commission for the period beginning August 28, 1906, the date the Hepburn Act became effective, and extending over, as he then supposed, a period of 16 months, ending with December 31, 1907. The docket number of the last complaint included in that summary was the last number given in the

annual report of the Commission for the year 1907. It was not discovered until after this summary had been printed in the *Railway Age*, and embodied in the volume entitled "Railroad Freight Rates in Relation to the Industry and Commerce of the United States," that the list of complaints printed in the annual report of the commission does not include those filed from the beginning to the end of the calendar year, but from December 1 of the previous year to November 30 of the calendar year for which the report is issued. The classification and summary referred to instead of covering a period of 16 months, therefore, included but 15 months.

To obtain a comparison that would show the relative number of complaints, their character, and the tendency of the decisions, a similar classification and summary has been made for the 15 months beginning January 1, 1908, and ending March 31, 1909. As on the previous occasion, this work has been done in the office of the commission, where every courtesy and facility has been extended by the chairman, his personal staff, the corps of examiners, and other employes.

To the informal complaints no detailed reference will be made in this place. These embody the grievances as to the odds and ends of railway conduct that reach the stage of a written communication. About one half of them are dismissed by the commission for lack of cause, and the remaining half are adjusted by the commission through correspondence with the carriers. Each of these complaints is, however, given a consecutive number, the total appearing in the annual report of the commission. The number of these informal complaints filed during the 15 months subsequent to January 1, 1908, is 6,118, contrasting with 3,374 filed during the 15 months immediately following the taking effect of the Hepburn law.

The first formal complaint filed in the year 1908 bears the docket number 1,383. The last complaint filed in March, 1909, bears the docket number 2,279, making the total number of formal complaints during the 15 months 896, which, on the surface, contrasts unfavorably with the total of 473 formal complaints filed during the first 15 months. There has, however, been a change in two important respects in the practice of the commission as to what are included in the formal complaints. During the first period it was the general practice to give but one docket number to various complaints that were essentially identical and in the aggregate has changed consists in the inclusion among formal complaints of many requests for reparation—many pertaining to cases of oversight, clerical errors, omissions in the tariffs, interpretation of classification, misrouting, and other matters which do not reflect upon the integrity of the existent rate structure, but upon the way in which it has been applied. The elimination of the 307 reparation complaints thus included reduces the number of formal complaints made directly against the existent rate structure to 298. Of these, 36 were against express companies and sleeping-car companies or in regard to passenger fares, leaving a total of 262 complaints directly affecting the tariffs and the practices of the railways in the transportation and handling of freight. Such complaints during the first 15 months aggregated 435. There has, therefore, been a reduction of 40 per cent. during the second 15 months. This total includes the docket numbers given by the commission, for convenience of reference and filing, to proceedings instituted by it, but which are not based upon specific complaints made to the commission. Of these are inquiries by the commission "In the matter of drayage," "In the matter of hours of service," "In the matter of through transportation between points in the United States and points in Mexico," "In the matter of the jurisdiction of the commission over rail and water carriers in Alaska," and "In the matter of its jurisdiction over water carriers."

There were eight complaints as to classification, mostly of trifling importance. The commission reduces the classification of German and Australian china and on mole traps. Complaints as to the classification of building and roofing paper and on bullion sweepings were withdrawn; a complaint as to raw tallow was dismissed. Request of the manufacturers of garments made of cotton goods, that they be reduced to the same classification as that of garments made of woolen goods, and a request of manufacturing confectioners that all candy be carried under the same classification, instead of a distinction being made between candy exceeding 10 cents per pound in value and candy of less value, remain undecided. During the preceding period of 15 months there were ten complaints as to classification, likewise inconsequential.

The following table shows a total of 35 complaints as to the rates on foodstuffs, which contrasts with 87 complaints for the previous period.

Table I.—*Foodstuffs.*

	Territorial groups.														
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
Grain and grain products	..	1	..	..	1	2	2	8	..	2	6	6	5	3	2
Dairy products	..	..	1	..	..	1	..	..	1	..	3	1	..	..	2
Fruits and Vegetables	..	2	..	2	2	..	..	4	..	..	10	1	6	..	3
Beer and liquors	..	..	..	..	..	..	..	2	1	..	3	1	1	..	1
Salt	..	1	1	..	..	..	..	1	..	..	3	..	..	..	3
Totals	..	4	2	2	3	3	2	15	2	2	35	9	12	3	11

constituted really but one case, the disposition of any one item including the disposition of the others. For example, the many complaints arising from the protest against the advance of lumber rates in the Southeast were assigned to the same docket number. During the period now under consideration each of such various items is given a separate docket number. In some cases 30 or 40 or 50 separate docket numbers indicate superficially as many different formal complaints, although they are in reality but a single complaint. That is, the protest of one man against a rate from A to B is one complaint, and the separate protests of a hundred men against the same rate from A to B constitute but one complaint. The unifying of such numbers—with the addition of the half dozen numbers that, for one reason or another, have been annulled—reduces the total number of formal complaints during the second period of 15 months to 605.

The second respect in which the practice of the commission

Kansas City complains that the present rate adjustment under which wheat and corn from northern Kansas go by direct routes to the Gulf ports at lower rates than apply over the longer route through Kansas City works to the detriment of the commercial interests of that city. This complaint is, evidently, the dying gasp of a lost cause and was dismissed by the commission. Kansas City unquestionably will remain a great grain center, but its dealers will have to recognize that they can no longer levy a toll on the grain produced in regions whence the flow is through cheaper routes to the Gulf. Kansas City also complains that the adjustment of rates on grain from west of the Missouri river does not give it the benefit to which its geographical location and commercial facilities entitle it in competition with Omaha. Omaha intervenes, stating that to grant the request of Kansas Ciy would unjusly discriminate against Omaha. Wichita intervenes, stating that to grant the request of Kansas City would unjustly discrimi-

nate against Wichita. St. Louis intervenes, asking to be heard upon the question. The commission holds that to give Kansas City the advantage that would come to it from a mileage adjustment would give it a monopoly of the territory in which Omaha now freely competes with Kansas City, and the application of the same rule to Omaha would give it exclusive purchasing power in territory in which Kansas City now competes with it on equal terms. The commission dismisses the complaint.

A previous decision of the commission, reducing the rate on flour from Buffalo to eastern and seaboard markets, brings forth a complaint from the millers of Minneapolis that the millers of Buffalo now have such an advantage in these markets that the business of the millers of Minneapolis and other points in the Northwest has materially diminished. These millers, accordingly, ask a reduction in the lake-and-rail rate on flour from 23 cents to 20 cents, to restore their ability to compete with their eastern rivals.

A noteworthy complaint is that as to the rate of 92 cents from Buffalo to certain eastern points from $2 to $1.45; the rate on stone from East Branch to Weehawken, N. J.; makes certain unimportant adjustments in rates on limestone from Bunker Hill, W. Va.; and in two or three minor complaints as to rates on cotton. An important decision is that on a protest as to increased rates on phosphate rock from mines in Tennessee to points in Indiana, Illinois, Ohio, New York, Pennsylvania and Michigan. The commission orders rates that are an advance over the rates previously in effect, but lower than those complained of. Another decision of importance is that ground iron ore in the Central Traffic Association and Trunk Line territory must be given not to exceed the sixth-class rating, and in Western Classification the Class D rating, ground iron ore thereby being given the same classification as pig iron.

The complaints as to rates on manufactured articles number 32, as compared with 57 during the first 15 months, applying to 19 articles, whereas 37 articles appeared during the earlier period.

TABLE II.—*Miscellaneous Raw Materials.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
Ground iron ore	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..
Stone and rock	..	1	2	2	2	..	..	1	..	..	8	5	..	..	3
Pyrites cinder	..	1	..	..	..	..	..	..	..	..	1	1	..	..	..
Nitrate of soda	..	1	..	..	..	..	..	..	..	..	1	..	1	..	..
Paper stock	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..
Cotton	..	..	..	..	4	..	..	..	..	..	4	3	..	..	1
Cotton, raw products	..	..	..	..	3	..	..	2	..	..	5	..	2	3	..
Totals	..	3	3	2	9	1	..	3	..	..	21	10	4	3	4

charged on large shipments of beer from St. Louis, Mo., to Leadville, Col., the rate being composed of 45 cents per 100 lbs. for the long haul from St. Louis to Pueblo or Denver, Col., and 47 cents from the much shorter haul from Pueblo or Denver to Leadville. The line from Pueblo and Denver west states that the 47-cent rate is proper, because of the extraordinary cost of maintenance and operation of the line to Leadville. The carriers deny that the shipments of beer were through shipments. The carrier leading from Pueblo and Denver west stated that it charged its regular local rate. Wholesale brewers and dealers of Denver intervene, stating that the practice of establishing through rates from the Mississippi river and the Missouri river to points west of Denver will unjustly discriminate against the Denver distributors. The commission held that the movement from St. Louis to Leadville was on a through billing at a joint rate, and, therefore, was a through shipment; that the rate is excessive, in that the proportion from Pueblo or Denver to Leadville should not exceed 30 cents, and ordered reparation in the sum of $2,327.51. From that judgment an appeal was taken to the District Court of the United States, which rendered a decision in favor of the commission. The cause is now pending on appeal to the Circuit Court of Appeals for the Eighth Circuit.

The commission has had a striking object lesson in verification of the adage that if one brick be disturbed the whole row of which it is a part will be upset. Two or three years ago, upon complaint of a manufacturer of ordinary brick that no higher rate should be charged upon his product than upon fire brick and paving brick, the commission announced that the rates upon brick should be adjusted upon a transportation basis without reference to the purpose for which the brick was to be used. This decision, which was in direct contradiction of a principle of wide application and general acceptance in rate adjustment, was rendered by the commissioner from California, who had but recently received his appointment, and it was published far and wide as an earnest that glaring injustice in freight tariffs was to be remedied. The railway companies thereupon averaged their rates on brick, reducing the tariff on the more valuable grades and increasing it upon the inferior. The basic rates, for example, of 20 cents and 25 cents, that had applied between Chicago and New York, were averaged at 22½ cents. Thereupon arose a storm of protest from manufacturers of facing brick and paving brick. The railways declined to reduce all brick to the 20-cent basis, and the margin of profit on ordinary brick is so low that its movement would be radically diminished if the rate were

TABLE III.—*Manufactures.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
Agricultural implements	..	..	..	..	..	3	..	..	..	..	3	..	1	..	2
Brick	..	1	2	..	..	..	..	..	..	..	3	..	..	..	3
Cement	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1
Fertilizer	..	..	..	..	3	..	..	2	..	..	5	3	..	1	1
Iron and steel articles	..	..	..	..	..	..	1	1	..	..	2	1	..	1	..
Plaster	..	1	2	..	..	..	..	1	..	..	4	1	1	..	2
Miscellaneous.*	1	2	2	..	3	2	..	2	1	1	14	2	1	2	9
Totals	1	4	6	..	6	5	1	6	2	1	32	7	3	4	18

*One each as to boots and shoes, burlap, cottonseed oil, empty beer barrels, furniture, measurite, manilla wrapping paper, rope and twine, soap washing powder, steam fire engine, tanks, walnut veneer, wire flesh forks.

The complaints as to rates on miscellaneous raw materials number 21, whereas they were only 12 in the first 15 months.

The commission reduces the rate per ton on pyrites cinder advanced to 25 cents. The commission has the matter under advisement.

The commission reduced rates on fertilizer between various

points in the South from 5 to 25 cents per ton, and made certain readjustments in rates on plaster.

The wholesale shoe dealers of Atlanta protest against the advance of the carload rate of 85 cents on shoes from Boston and New York to 93 cents, stating that they will be handicapped in competition with the wholesale manufacturers and dealers of St. Louis and other points in the Middle West. The railways claim that the 85-cent rate was placed in effect through error, and that inasmuch as boots and shoes are charged at the first-class rate for any quantity throughout the United States, a carload rate should not apply in the South.

Table IV.—*Lumber, Coal, Oil and Ice.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
Lumber	..	..	..	..	1	2	1	7	5	..	16	4	2	2	8
Coal	1	4	4	..	..	3	..	4	2	..	18	4	5	3	6
Oil	..	..	..	..	..	..	..	4	..	..	4	1	1	2	..
Ice	..	4	..	..	..	..	..	..	..	..	4	4	..	..	..
Totals	1	8	4	..	1	5	1	15	7	..	42	13	8	7	14

A condition approximating equilibrium seems to have been attained in the tariffs on lumber, there being but 16 complaints, as compared with 37 for the first 15 months, and no decisions modifying the rates in the considerable channels of traffic. A decision of the commission annulling the advance of 2 cents per 100 pounds on pine from the southeastern states did not serve as a precedent in the disposition of a protest as to similar advances from points in the Southwest, the commission holding that conditions of production west of the Mississippi river are different from those to its east. In dismissing the complaint the commission gives utterance to the very important dictum that carriers are not obliged, in adjusting their charges, to equalize the value of commodities in their distribution and that a carrier is not necessarily guilty of unjust discrimination because it does not afford as favorable rates as other carriers, although the products carried by each are brought to the same market. Questions arise as to the charging of higher rates on cottonwood than on walnut, on walnut than on oak, and on oak than on pine, which have not been decided. The commission orders that rates on lumber from the Missoula district in Montana shall be from 3 cents to 5 cents under the rates from the Spokane territory.

Although there are but 19 complaints as to the rates on coal, just half the number made during the first 15 months, they bring up some very important points. An anthracite coal dealer states that rates ranging from $1.15 to $1.60 on anthracite coal from the mines to tidewater are unjust, and asks reparation in the sum of $125,000 on the basis of a rate of $1, which he declares would be reasonable. There has been an increasing tendency toward the affiliation of the processes of production and a distribution of anthracite coal, which has not been retarded by the decision of the Supreme Court on the commodities clause. It is claimed by many that this affiliation inures to the benefit of the miner, the carrier and likewise to the consumer. The smaller dealers are struggling to maintain a foothold in the markets and this case, which has not been decided, is typical. The commission decides that rates on cannel coal shall be no higher than those on bituminous coal. The coal operators of Allegany county, Maryland, complain that rates from their mines to points in Pennsylvania, New Jersey, New York, and to tidewater are unjustly discriminatory in comparison with rates from competing West Virginia and Pennsylvania coal regions, which are farther distant from tidewater. The defendants state that rates from the Pennsylvania and West Virginia fields referred to were made in competition with the Clearfield and other coal regions of central and northern Pennsylvania, and that they should not be compelled to reduce their rates from the fields of the complainants. In group No. 8 are various complaints as to rates on coal from the fields of Colorado to points in other states, in comparison with the rates from their coal fields to other markets. This complaint the commission dismisses, and also refuses to allow reconsigning privileges.

The discovery by copper smelting companies of Arizona, who bring coke from West Virginia and Western Pennsylvania, that the through rate charged thereon includes the sum of $2.65 per ton for the haul from Pittsburgh to Chicago, whereas coke is hauled between those points for use in the blast furnaces of the Chicago district at $2.35, has brought forth some forty complaints that are each given a docket number, although they constitute what is essentially one complaint that is so listed in the tabulation. The railways state that the coke used in the Chicago blast furnaces is shipped in large carloads which are promptly unloaded and returned to the coke ovens, whereas coke for copper smelting has to be loaded in cars of general use, of smaller capacity, that are not returned for weeks or sometimes months. They state that the difference in rates had existed for many years and had not before been made the subject of complaint. It seems to be the kind of case unearthed by one of the species of claim lawyers who devote their time to scrutinizing tariffs for the purpose of detecting differences, which they bring to the attention of shippers and then take up before the commission on speculation. In this case the defendants also point out the commercial necessity for making lower rates on coke to the blast furnaces, which does not exist with the smelting furnaces, whose product is sold at extraordinary profit.

Table V.—*Through Routes and Joint Rates.*

	Territorial groups.										Total.	Decided in favor of complainant.	Dismissed, withdrawn or indefinitely postponed.	Adjusted or compromised and withdrawn.	Not decided.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.					
On grain	..	..	..	..	..	2	..	1	..	..	3	1	1	1	..
On fruit	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..
On coal	..	1	..	..	..	..	..	..	..	..	1	1	..	..	..
On cottonseed	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1
On coal	..	..	..	..	1	..	..	1	..	..	2	..	..	1	1
On salt	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..
In general	..	1	1	1	1	..	..	..	2	1	7	..	1	2	4
Totals	..	3	1	1	3	3	..	2	2	1	16	3	2	5	6

That commodity which probably has caused more discussion than any other in connection with railway rates during the past generation, cuts but little figure. Of the four complaints as to oil, three are dismissed; in the fourth the rate of 8 cents per 100 pounds on crude petroleum from Paola, Kan., to Kansas City, is reduced to 7 cents.

The commission makes radical reductions, ranging as high as 30 cents per ton, on natural ice from the mountain lakes in New Jersey to various points in the East and to tidewater.

THE EARLIEST BALANCED LOCOMOTIVES.

BY HERBERT T. WALKER.

(Illustrated from the Original Drawings.)

It is not generally known that the four crank balanced locomotive was originally designed, if not built, in the days when Stephenson's "Rocket" was doing regular, every-day work, and locomotives and railways were still in the experimental stage.

Some years ago, when the present writer was investigating the subject under notice, he obtained the use of the diaries of the inventor of the first four-crank locomotives, which were specially designed to overcome the disturbing effects of unbalanced reciprocating parts, together with the original working drawings of the engines.

The designer of the engines in question was John George Bodmer, M. Inst. C. E. (England), who was a native of Switzerland and born at Zurich in 1786. As Switzerland gave no protection to inventors, Bodmer emigrated to England about 1830, where he settled in Bolton, Lancashire, hiring shop room and power at the works of Rothwell & Co.,* where he built a double piston stationary engine with a 10-in. cylinder, which was probably the first balanced steam engine in the world.

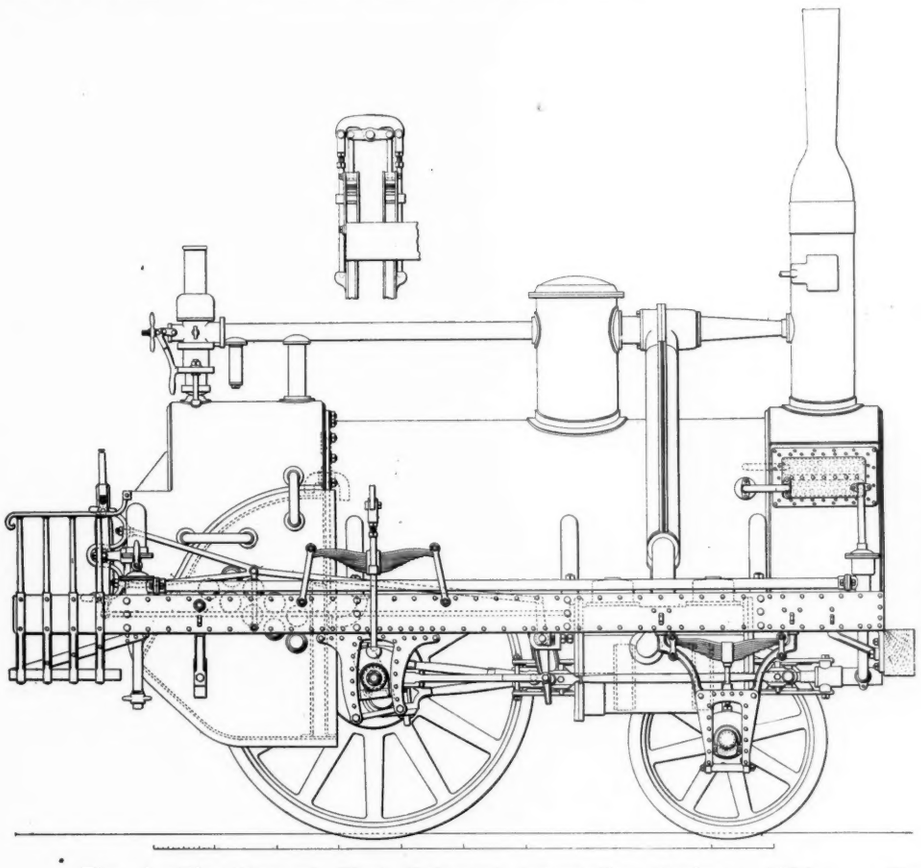


Fig. 1—Elevation of First Balanced Locomotive Design. 1834.

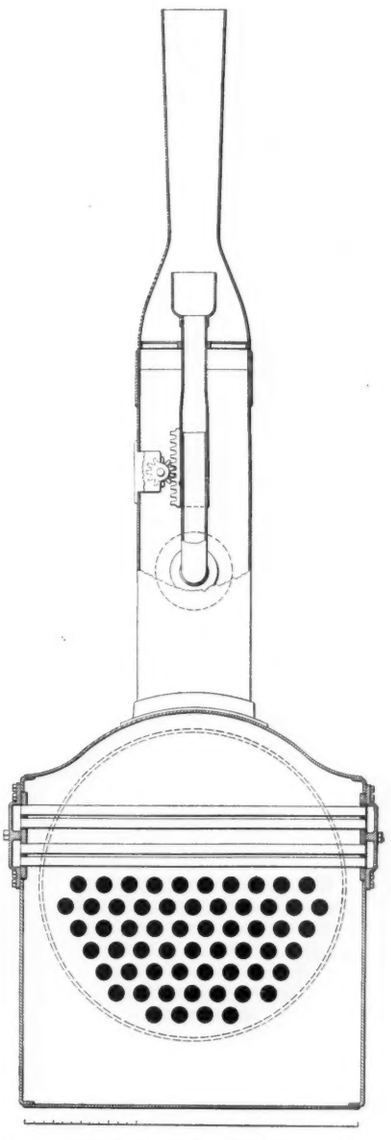


Fig. 2—Cross Section of Engine. 1834.

Following are selections made from the 1833 and 1834 diary entries. "Invented my fire-grate and the steam engine with double pistons. I made an arrangement with Peter Rothwell for the patents, which we took out. When he saw the engine, of which we made an experimental one, he thought that it would too much reduce the weight of iron, so that his foundry must go to rats."

In other passages Bodmer explains that the engine, being in balance, the reciprocating parts could be made much lighter than in common engines. Continuing his comments on Rothwell's objections, he adds: "I could not get him to proceed, and from a bargain with Mr. Hick he kept me out because he liked neither arrangement.

"1835. I sent the engine and a small grate to France to secure my patent there. It worked, as well as the grate, before the commission."

He secured two British patents in 1834, one for the grate, which was an elementary mechanical stoker, and the other for steam engines, embodying his system for balancing the reciprocating parts.

Bodmer was one of the most prolific inventors of the nineteenth century, and did not confine himself to balanced engines. He originated some important improvements in cotton spinning machinery and machine tools, the majority of which were subsequently ascribed to later inventors. He also introduced a system of rolling railway wheel tires in the circle, which has been in use from the year 1840 to the present, complete plants having lately been supplied to the Standard Steel Works Company and to the Japanese government.

After the Bolton period, Bodmer entered into partnership with Birley & Co. and opened a foundry and machine shop near Birley's cotton mills at Chorlton-upon-Medlock, Manchester, where a variety of machinery and a few locomotives were built. This enterprise was a failure, largely owing to the fact that Bodmer was "a foreigner" and the British work-

*See *Railroad Age Gazette*, April 2, 1909, page 753.

men were strongly opposed to him. His diaries have many entries which describe in forcible language his heart-breaking experience with British engineers, who, while they affected to depreciate Bodmer's innovations, were not slow to copy them and place them on the market as their own. As Bodmer patented his inventions he was enabled to collect substantial damages from his infringers.

A few of his locomotives will now be described and illustrated from the original drawings, the description and remarks being drawn as nearly as possible from Bodmer's diaries and notes.

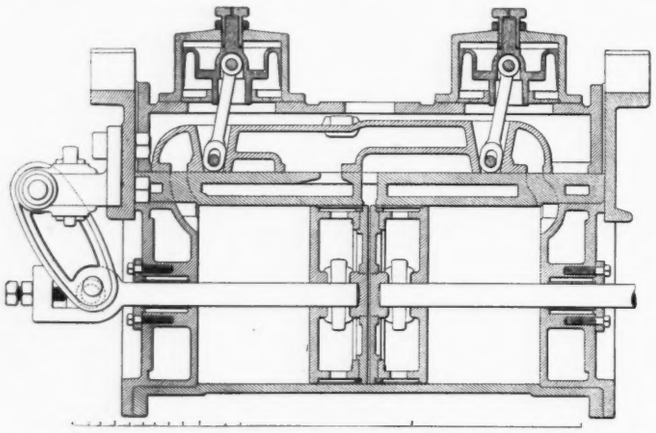


Fig. 3—Section of Cylinder and Valve Chest. 1834 Design.

Fig. 1, dated Bolton, 1834, shows a locomotive according to Bodmer's original design. The near side wheels have been omitted, probably to show the mechanism more clearly. Fig. 2 is a cross section through the smokebox, and Fig. 3 (dated Aug. 30, 1834) is an enlarged section of one of the cylinders and its valves. The driving wheels were 5 ft. diameter and the cylinders were 12½ in. diameter with a total piston stroke of 16 in., each piston—two to each cylinder—having a stroke of 8 in. The firebox was similar to Stephenson's "Rocket" of 1829. It was bolted to the boiler as an independent structure, and had inside and outside circulating pipes; also transverse water tubes. The rear piston rods actuated the cranks in the usual manner, but the front pistons had their rods connected to cross-heads and these were coupled by rearwardly extending transmission rods to vibrating arms rocking on a fixed cross shaft. These arms, in turn, had connecting rods working cranks which were disposed oppositely to the cranks worked by the rear pistons. The working parts thus moving in opposite directions, their stresses were practically neutralized, and the engine was thus balanced. Each cylinder had three ports, and in the position of ports, shown in Fig. 3 steam will enter the middle port and drive the pistons apart. The slide valves were also balanced by steam pressure on the small pistons, as shown. This plan was reintroduced by subsequent inventors. Bodmer used metallic packing in all his engines. The front cross-heads worked the pumps which forced water through transverse pipes in the smokebox. The valve gear was a single eccentric hook motion, the peculiar part of it being that the reversing levers were rocked in a plane transverse to the center line of the engine to bring their pins into or out of gear with the respective hooks on the reach rod. The driving axle had double journal boxes and double springs—see separate detail in Fig. 1—which were connected by transverse equalizing levers. This device was used 20 years later by Pearson in his Bristol and Exeter engines which were illustrated in the *Railroad Gazette* June 17, 1904, p. 30. The journals were lubricated with oil supplied to them by small rollers mounted in spring arms in the boxes. The pedestal jaws had curved guides for the driving boxes, so that "the same distance will at all times be preserved between the ends of the piston rods and the center of the crank shaft." The crank pins were concave and the brasses were convex to equalize lateral strains. The steam pipes were outside, and a rotating throttle valve was in a box at the front of the steam dome with a rod running inside the pipe to a T handle. This rod had a square part which ran loosely through the throttle valve and terminated in a small miter valve forward of the throttle valve. If the engineman wished to urge the fire when the engine was standing he moved this rod lengthwise by the pendulous lever shown, thus opening the miter valve without disturbing the throttle, and so admitting live steam to the exhaust pipe. This is an early example of the blower.

The exhaust steam passed upward through pipes outside of the steam pipes. The blast nozzle could be raised or lowered by a rack and pinion, the shaft of the pinion being shown broken off outside the smoke stack. As the blast nozzle was but little smaller than the diameter of the contracted part of the stack, the draft could be regulated, or it could be stopped completely without impeding the exhaust.

It is doubtful if this engine was ever built, as the drawings, although made 75 years ago, are in good preservation, showing no signs of having been in the shops, as do the drawings of later engines presently to be described.

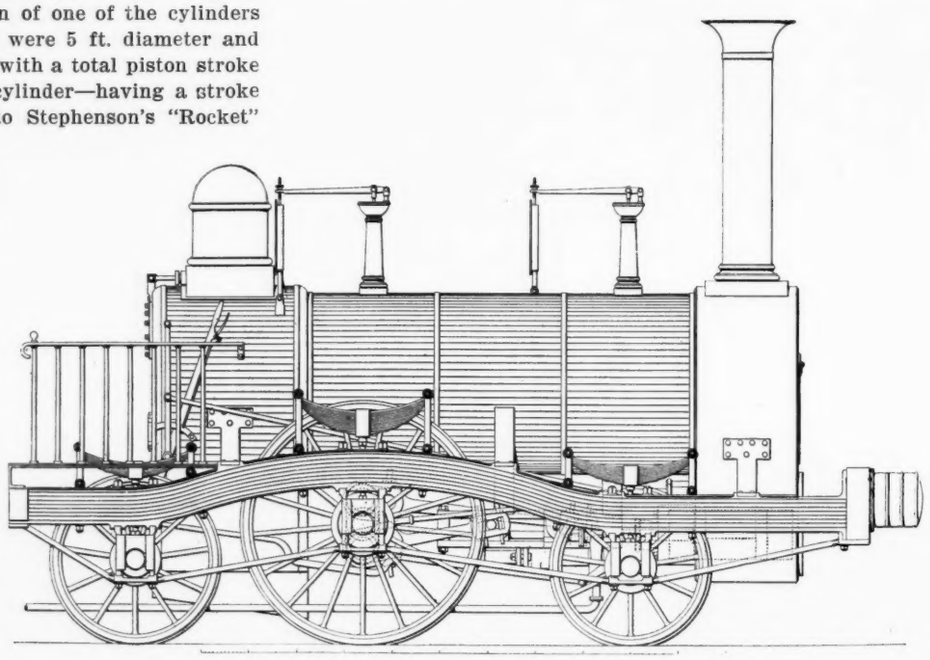


Fig. 4—Elevation of Passenger Engine. 1842.

The earliest drawing of the next engine is dated May 31, 1842, and an elevation is shown in Fig. 4. The cylinders were 12 in. diameter with a total piston stroke of 24 in. Driving wheels 5 ft. diameter. The valves were cylindrical. Instead of the double piston rods extending through opposite ends of the cylinder, as in the previous engine, the rod of the front piston slid within the hollow rod of the rear piston, actuating oppositely disposed cranks. This device was also protected by the same patent (1834) that Bodmer took out to cover the engine shown in Fig. 1, and it was used in all of

his subsequent engines. The valve motion of the engine under notice was of the V hook type and was used for reversing only. It actuated ⊏ slide valves with a fixed cut-off. Separate eccentrics worked cylindrical expansion valves which were made in two parts and mounted on a valve spindle having right and left-hand screw threads. This spindle was rotated by gear wheels through a rack and pinion arrangement connected to the upright lever on the foot-plate, and the other lever (shown in the forward notch of the quadrant) was for reversing. The effect of varying the distance between the two parts of the expansion valve was to change the lap and thus the ratio of expansion. The frames of this engine were built up by a series of wooden planks laid flat-wise, with iron plates top and bottom, and the whole bolted firmly together, "thus forming a bridge or arch." The journal boxes and brasses were spherical. They permitted a swiveling motion at right angles to the length of the engine, thus equalizing lateral strains.

It is not certain that this engine was built, although the

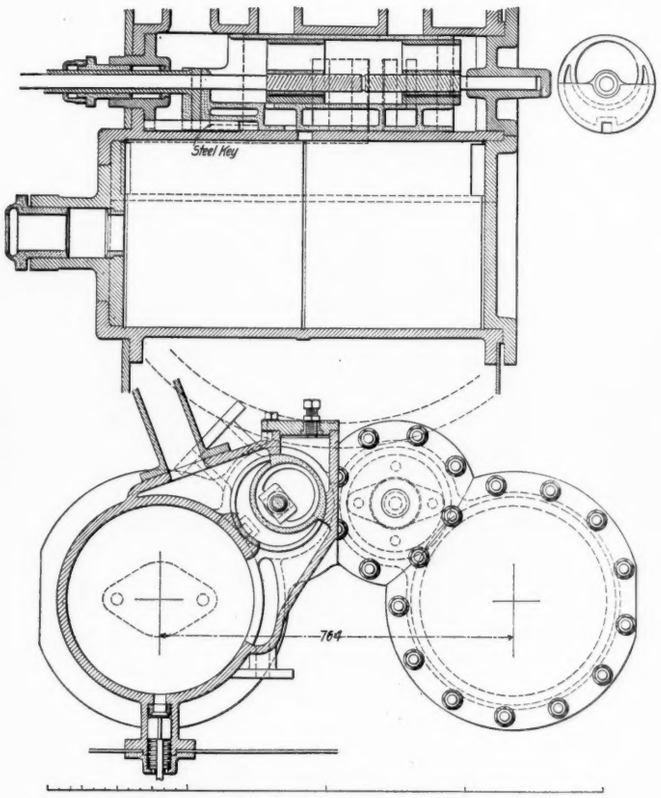


Fig. 5—Details of Locomotive No. 1. London & Brighton and South Eastern. 1845.

drawings were evidently sent into the shops, but by patient investigation it has been learned that an engine very similar to it was built for the South Eastern Railway and designated by the builder (Bodmer himself) as "No. 1."

There were two other locomotives, "No. 2" and "No. 3," built by Bodmer for the same road, and these three engines will now be described and shown. The earliest drawings of these engines are dated Feb. 14, 1844, and the latest bears date May 7, 1845. No general view of engine "No. 1" is to hand unless it was the engine illustrated by Fig. 4, but the details show that the cylinders were 16 in. diameter with a total piston stroke of 24 in. The engine was originally designed with ⊏ slide valves, but a later drawing shows cylindrical valves and is reproduced in Fig. 5. The spindle of the cut-off valve passed through that of the main valve, the expansion being varied by similar means to those described in connection with the engine shown in Fig. 4. The cylinders and valve chests had automatic relief valves. "No. 1" may or may not have been the engine shown in Fig. 4.

(To be continued.)

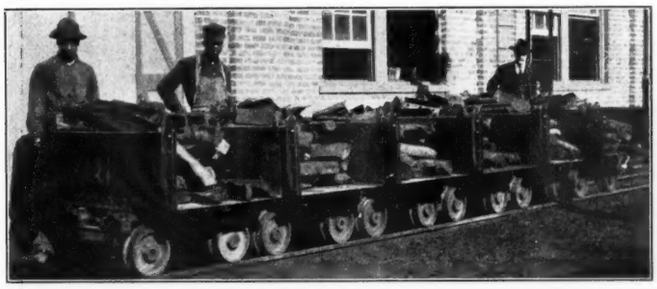
WHEEL FOUNDRY AND FOUNDRY METHODS; NORFOLK & WESTERN.

BY GEORGE L. FOWLER,
Associate Editor of the *Railroad Age Gazette.*

II.

Now, when the metal has been mixed in the cupola, the condition of the coke used, the pressure of the blast, and variations from the calculated chemical content may make variations in the product that must be met and brought back to the standard requirements as the melting and pouring progresses.

This is done by casting test pieces from each pouring of 10 wheels. The test pieces are broken as soon as they are cool, and if the chill is below the standard, the corresponding wheels are broken up, and a change made in the chemical composition. To do this a pile of short ends of steel rails and some ferro silicon is kept at hand. Should the test pieces show that the chill is becoming deeper than it should be, some ferro silicon is added which liberates some of the carbon and increases the silicon content and thus introduces a softening element that reduces the chill. If the chill is too shallow,



Charging Trucks; Roanoke Wheel Foundry.

a piece of steel rail is added to the ladle. This lowers the average silicon content, by which the softening element is decreased and at the same time increases the percentage of manganese, because of its own higher content, and thus also adds a hardening element to the mixture. The foreman, therefore, remains by the cupola constantly during the pouring in order to watch for such variations as may occur and correct them at once.

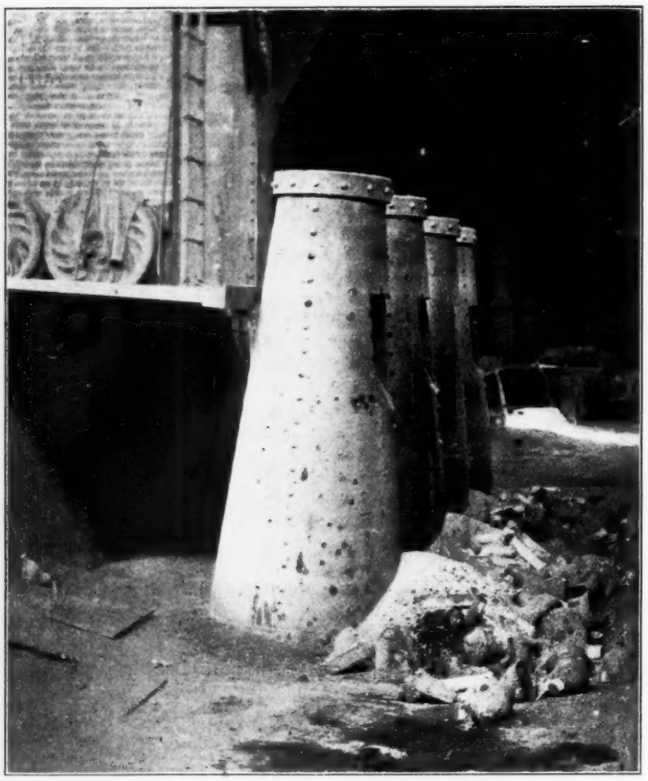
This relates solely to the chemical composition and the

Cone of Slag With Iron Button; Roanoke Wheel Foundry.

apparent physical structure that is found to exist in the test pieces. Naturally these latter do not act in the same manner as the chill on the tread, for they are small and have no such body of metal behind to maintain the heat and lower the depth of the chill. A co-efficient is, therefore, necessary in order to judge of the probable depth of the wheel chill and this is one-half. As it is desired that the chill on the tread shall be about ⅝ in. the composition of the metal is so adjusted that that of the test piece is about 1¼ in.

Then, too, care is taken in the selection of the coke used. Owing to the proximity of the Pocahontas coal field and the availability of its coke, that is the only grade used in the cupolas. No specifications have, as yet, been drawn for this fuel. Its purity depends upon that of the coal from which it is made, and as the character of the coal from the Pocahontas mines is well known, the officials are content to simply specify the operation from which the coke shall be shipped.

The coal, of course, varies in each seam, and no absolute



Cones for Removing Cores from Wheels; Roanoke Wheel Foundry.

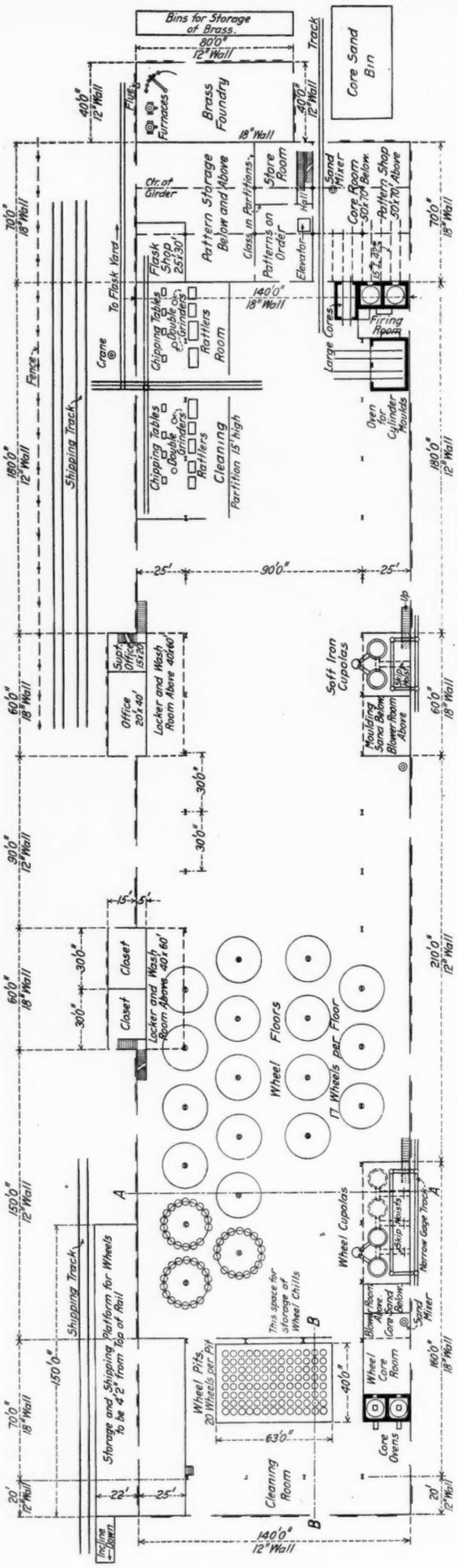
analysis is possible, but for the main Pocahontas seam the following may be taken as a fair representative analyses:

Moisture	0.27	per cent.
Volatile matter	15.73	"
Fixed carbon	79.80	"
Ash	4.20	"
Sulphur	0.61	"
Phosphorus	0.0045	"
Accounted for	100.6145	"
British thermal units	15,413	

From such a coal as this coke would be obtained that would analyze about as follows:

Moisture	0.09	per cent.
Volatile matter	1.00	"
Fixed carbon	93.20	"
Ash	4.95	"
Sulphur	.71	"
Phosphorus	.05	"
	100.00	per cent.

In addition to specifying the operation from which the coke is to be made, it is also required to be 72 hours coke, and analyses taken at haphazard from the foundry books give results that, while varying somewhat, do not do so to any

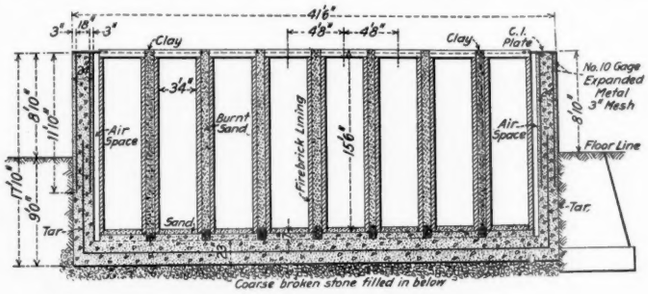


General Layout; Norfolk & Western Wheel Foundry at Roanoke, Va.

serious extent in that crucial element sulphur. Four such analyses are:

	1.	2.	3.	4.	Av'ge.
Volatile matter ...	1.20	0.92	1.00	0.86	0.995
Fixed carbon	91.32	92.32	92.30	92.22	92.040
Ash	7.48	6.76	6.70	6.92	6.965
Sulphur	0.68	0.72	0.65	0.70	0.683

The high percentage of fixed carbon in the Pocahontas cokes makes them rapid heaters and reliable for the work, but they are not as hard and cannot bear the burden of the Connellsville product. It is possible, however, to strengthen the bed very materially by the use of a percentage of the Stonega coke from Wise Co., Va., which is much stronger, and contains only about 86 per cent. fixed carbon, 12 per cent.



Section of Annealing Pits.

ash, but has about 2 per cent. sulphur. This has been tried to an extent, and a mixture of the two is being used by some of the private foundries with good results. The fuel question is, however, one that is causing no trouble whatever.

This must not be understood to mean that the method of melting is a matter of indifference, for the greatest care is also taken in this regard, for it is well known that different blast pressures must be used with different cokes. For example, while the Connellsville will stand a pressure of from 16 to 17 oz. the Pocahontas coke, which is softer and a rapid melter, requires that the pressure shall be cut down to from 8 to 10½ oz. At the same time the iron for wheel work must be melted hot, and yet in this the foundryman is between the devil and the deep sea; for, while hot melting adds to the ability of the wheel to withstand the thermal test, it is the dull melted iron that is best capable of resisting the drop test. It, therefore, becomes necessary for the foundryman to be on hand at the cupola during the whole period of pouring, to watch every change in the metal as it goes into the ladle, and to make such adjustments and changes of blast pressure as may be required by the changing condition of the bed and iron in the cupola.

The method of operation is to put down 4,000 lbs. of coke in the bed and to follow it with charges of 5,500 lbs. each, with 550 lbs. of coke between charges. This will give a total melt of about 8 lbs. of iron to 1 lb. of coke for the day's run. It has already been noted that the silicon content of the early charges is made slightly lower in the first five charges than it is in those that follow. Taking the charges, the details of which have been given, we find that they are made up of the following percentages:

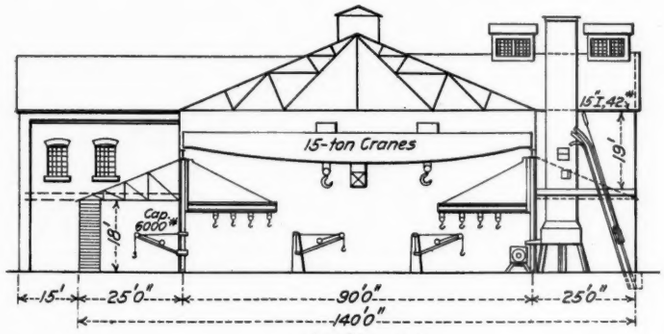
Old wheels	49.09 per cent.
Steel rails	5.45 "
Malleable scrap	5.45 "
Coke iron	25.45 "
Charcoal iron	14.56 "

But it must not be considered that this is a hard and fast rule, especially in the matter of the proportion of the coke and charcoal irons, though the other items are holding with greater regularity. In this attention is also called to the proportion of old wheels used, which is lower than that used in some other places where 60 per cent. is the practice.

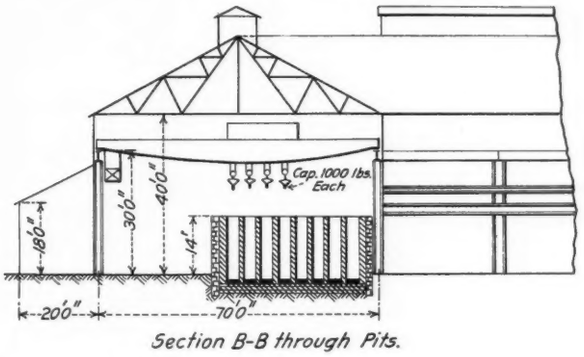
It is, therefore, considered that a mere statement of the brands of iron used and the amount of scrap carried can convey no adequate idea at all as to what is actually being done in the cupola. The analysis of both the iron and the coke is regarded as of the first importance in the predetermination of the results. The mixing takes the silicon into account first of all, obtaining an average of about .62 for the first and .63 for the later charges, while the combined carbon is kept near .67.

In the coke, provided it is strong enough to bear the burden, the sulphur is the essential feature, because an excess will cause the iron to have a sulphur hardness and be brittle on that account, and this may happen whether the excess occurs in the form of the sulphide of iron or the sulphide of manganese. Hence the use of a 72-hour foundry coke that has about 93 per cent. of fixed carbon, 5½ per cent. of ash, from .8 to 1.5 per cent. of volatile matter and never more than .6 per cent. of sulphur and as much less than this as possible. Then, to hold it down the blast is kept uniform, with a pressure of from 8.5 to 9.5 oz.

The watchfulness that is exercised over the working of the cupola during the period of melting and pouring is carried out to the details of the work, for it is quite as necessary that it should be known as to what wheels are poured from each ladle of iron as it is to know the character of that iron. For, if this did not obtain, and certain test pieces showed an adequate chill, or one that was excessive, it would be necessary to either discard the whole heat or accept some wheels that were known to be defective. This contingency is provided for in a very simple manner. At the beginning of the day's work each moulder is given a slip, in the usual way, containing the wheel numbers that he is to use and the order in which he is to use them. Then, in pouring, each moulder pours five wheels at a time in turns, and by knowing their rotation each set of ten wheels can be at once referred to its corresponding test piece.



Section A-A



Section B-B through Pits.

Sections of Norfolk & Western Wheel Foundry.

After years of experimenting and trial, as outlined above, the officers have come to the conclusion that they are obtaining better results under the present system than under any of the others that have been tried. The test pieces run very uniformly with a chill about twice as deep as that of the wheel, and the chemical composition is satisfactory. It has been found that when wheels fail in the thermal test they are apt to be low in manganese, whereas when they shell out on the road

they are apt to be high in manganese. In making the thermal test it is usually done with some severity. The metal is poured very hot and as rapidly as it can be run, so that the flange is frequently melted away. In spite of the severity of this test, there have been as yet no wheels cracked on this test this year.

In casting, a plain, smooth chill is used. Work has been done with various forms of contracting chills, but the conclusion has been reached that they offer no advantage over the plain chill that is used. The men are allowed considerable latitude in the matter of speed and temperature of pouring and individual preferences are not interfered with, though, as a matter of fact, there is not much difference of practice in this regard, as the men usually pour the metal rapidly as it is received, and this produces the uniformity in the product that is desired. Of course, they cannot pour any hotter than the metal reaches them, and wheel molders have such a wholesome regard for the dangers of seamy or shot treads that they are not apt to wait until the metal is too dull to work.

In inspection the acceptance of wheels is kept rigidly within the 1 point above or below the 33-in. diameter, as indicated by the circumferential tape. In this respect the reports of inspection of the Norfolk & Western wheels are much better than of those bought from outside concerns.

In the past, when the inspection was evidently not as rigid as it is now, an examination of the inspection reports extending over a period of thirteen years does not show a single case where the wheels were as many as 2 points out of the way. Whereas, the records of a comparatively insignificant number of bought wheels show that the variation may run from 1 to 3 points above or below the standard, and that, too, in wheels that come from reputable houses.

As for the records of these wheels, they are far above those bought. As stated, only 1 point above or below the standard is accepted, and this has been found to correspond to a depth of chill of about ⅜ in., where the record is above and not more than ¾ in. where the taping shows 1 point below. It has been found, when placing them in comparison with outside wheels, that though the latter represented but 7 per cent. of the total number of wheels under the equipment, they were responsible for fully 50 per cent. of the damage done by wrecks, and that about 15 per cent. could be attributed to foreign wheels under foreign cars, leaving the Roanoke wheels responsible for only about 35 per cent. of the total damage, although they were under 93 per cent. of the home equipment and are used for both passenger and freight service.

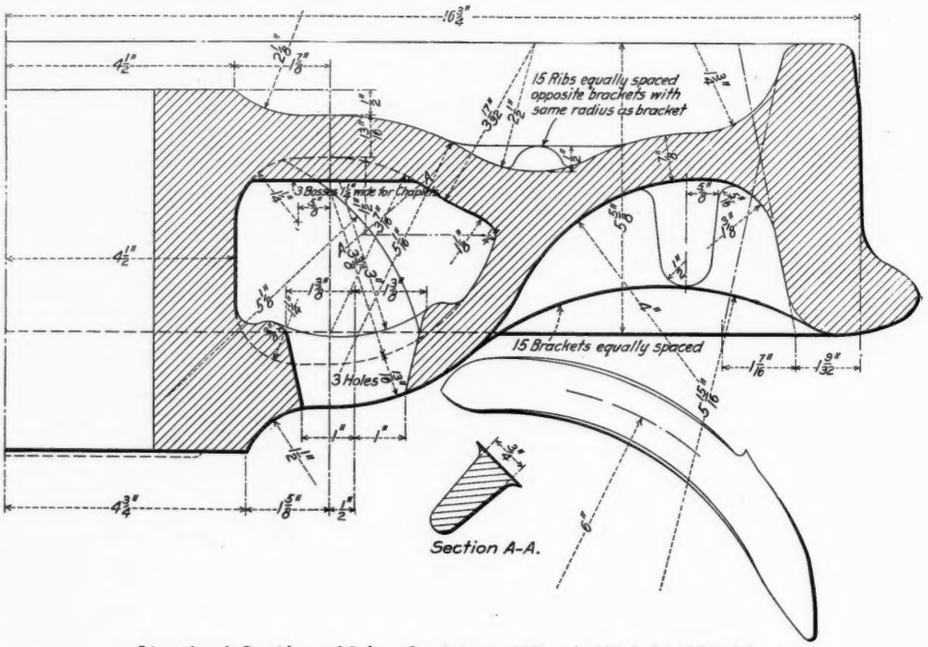
The specifications under which all wheels are made and purchased by the road are as follows:

"All wheels must conform in general design and in measurements to the drawings furnished by the railway company, and any departure from these drawings must be made only by special permission in writing.

"All wheels must be truly circular in the tread, and will be rejected if out of round more than one-sixteenth of an inch.

"All wheels must have the name of the manufacturer, place of manufacture, and normal weight plainly cast on outside plate, and must be numbered consecutively according to the instructions furnished with the order. The letters "N. & W.," the date cast, and the number shall be cast on the inside plate with letters and figures not less than 1¼ in. high, and raised ⅛ in. above the plate of the wheel. No wheel bearing a duplicate number, an altered or defaced number, or a number which has once been passed upon will be considered. Numbers of wheels once rejected, spoiled wheels, or wheels used in making test are to remain unfilled. Wheels bearing dates more than 30 days prior to date of inspection will not be considered.

"All wheels must be taped with M. C. B. standard design of wheel circumference tape, and must have the shrinkage number stenciled in plain figures on the inside of the wheel. Wheels of the exact circumference for 33-in. diameter to be stenciled with the figure "3"; wheels down to one-eighth of an inch less in circumference will be stenciled with the figure "2"; wheels up to one-eighth of an inch greater in circumference will be stenciled with the figure "4"; and over one-eighth, and up to one-quarter of an inch greater will be stenciled with the figure "5." The inspector will retape not less than 10 per cent. of the wheels submitted for test, and if he finds any showing wrong tape marking, he will tape the whole lot and require them to be restenciled and the old stencil marks obliterated.



Standard Section, 33-in. Cast Iron Wheel, Weight 680 Lbs.

"Wheels cast in chillers varying more than one-thirty-second of an inch in diameter will not be knowingly accepted. Wheels which show over ¼ in. (tape 5) greater in circumference than the normal circumference for 33-in. wheels, and over ⅛ in. (tape 2) less in circumference than normal circumference of 33-in. wheel will be rejected. This will be one of the methods of detecting variations in diameter of chillers, and this clause will be rigidly adhered to.

"The body of the wheel must be smooth and free from shrinkage, cracks and blow holes. The tread and throat must be free from wrinkles, slag, sand wash, chill cracks and sweat beads. Wheels with swollen rims or any external evidence of hollow rims or hubs will be rejected. Thickness of flange will be regulated by the standard M. C. B. maximum and minimum flange gage.

"Inspector must weigh and gage at least 10 per cent. of the wheels submitted, and if any of these wheels fail to conform to specification, he will weigh and gage the whole lot, rejecting all wheels which fail in these respects.

"Wheels offered for inspection must not be covered with any substance which will hide defects.

"For each cast of wheels which does not contain over 150 wheels, that pass inspection and are ready for shipment, three additional wheels must be furnisned at the expense of the

manufacturer for test. When the cast contains more than 150 wheels, four wheels shall be furnished. The wheels selected to be of the maximum and minimum tape measurements for circumference, of the lot of wheels they represent. Two of these wheels, one of maximum and one of minimum tape measurement, are to be subjected to this drop test:

"The wheel must be placed flange downward on an anvil block weighing not less than 1,700 lbs., set on rubble masonry at least 2 ft. deep, and having three supports not more than 5 in. wide for the flange of wheel to rest on. The wheel shall be struck centrally on the hub by a weight of 200 lbs., the lower face of which shall be flat and 8 in. in diameter, dropping the number of blows from a height as set forth in the following table for wheels of different weights:

	Drop test—	
	Fall of drop.	No. of blows.
Weight of wheels, 600 lbs..	9 ft.	10
" " " 650 " ..	10 "	12
" " " 680 " ..	12 "	12
" " " 700 " ..	12 "	12

"Should either of the wheels tested break in two or more pieces with less than the required number of blows, the wheels represented shall be rejected.

"The remaining wheel or wheels selected for test, which must be of the minimum for tape measurement, to be subjected to the following termal test:

"The wheel must be laid flange down in the sand and a channel way one and one-half (1½ in.) inches wide, and four (4 in.) inches deep molded with green sand around it. The clean tread of the wheel must form one side of the channel way, and the clean flange must form as much of the bottom as its width will cover. The channel way must then be filled to the top with molten cast iron, which must be hot enough when poured so that the ring which is formed when metal is cold shall be solid or free from wrinkles or layers. The time when the pouring ceases must be noted, and two minutes later an examination of the wheel must be made. Wheels which are wet or which have been exposed to snow or frost may be warmed sufficiently to dry them or remove the frost before testing. Under no circumstances must the thermal test be applied to a wheel that in any part feels warm to the hand. Should the wheel tested break in two or more pieces or if any crack in the plate extends into the tread, the wheels represented will be rejected.

"Wheels tested must show soft, clean, gray iron, free from defects, such as holes containing slag or dirt more than one-quarter of an inch in diameter, or clusters of such holes, honeycombing of iron in the hub, white iron in the plates or hub, or clear white iron around the chaplets at a greater distance than one-half of an inch in any direction.

"The depth of clear white iron shall not exceed seven-eighths of an inch, be less than three-eighths of an inch, nor vary more than one-quarter of an inch around the tread on rail line, in the same wheel. The blending of the white and gray iron producing a mottled appearance shall not extend more than 1½ inches from face of tread or throat of wheel. The depth of chill is to be determined by the three wheels used for drop and thermal test for each lot of wheels submitted.

"Wheels are to be tested at the place of manufacture, and manufacturer must notify this company when ready to ship not less than 500 wheels or entire quantity when less than 500 are ordered. Must await the arrival of inspector, furnish facilities and labor to enable inspector to make proper test and inspection, and load and ship the wheels promptly.

"In making inspection, inspector shall make record of the wheel number of all wheels, accepted and rejected, and individual wheels will be considered to have failed, and will not be accepted, or further considered which:

"(1) Do not conform to standard design and measurements.

"(2) Are more than two per cent. under or over weight.

"(3) Have physical defects prescribed by this specification."

And yet despite the fact that rigid inspection is always in force there is the marked difference already noted between the home-made and the purchased article.

The standard section that has been adopted for the high-capacity cars weighs 680 lbs. and varies in many of its details from the 650 lbs. and 700 lbs. wheel of the M. C. B. recommended section. If a comparison is made between the wheel shown and the association recommendation it will be seen that the most noticeable variation lies in the use of an outside rib, placed opposite to the inside brackets and having the same radius. This serves to materially stiffen the wheel in the plates which are thinner than even the M. C. B. 650 lbs. wheel, the Norfolk & Western being but ⅞ in. thick, while the other is 1 in. The same statement holds also for the double plates where there is a difference of ⅛ in. in the front and $\frac{1}{16}$ in. at the back. To compensate for this the wheel has three bosses, each 1¼ in. wide in the pan for chaplets. As for the important dimensions of tread, flange and hub, they, of course, corespond to the M. C. B. standards.

As for the enduring qualities of wheels, the removals for such purely wheel defects as broken and chipped flanges, broken and seamy tread, shelling out burns, and cracked plate amounted to but 10.2 per cent. of all Roanoke wheels removed in 1908. This is a slightly higher percentage than for foreign wheels for the same cause, but covers a far heavier mileage. The estimates based on the wheels removed during 1908, places the life of cast-iron wheels at 6.8 years in freight service, 1.1 years in passenger service and 2.8 years under tenders.

A summary of the whole situation on the Norfolk & Western is embraced in the statement that it is the belief of the officers that the methods pursued result in the production of as high a quality of cast-iron wheel as can be made under the most advanced conditions of modern commercial metallurgy and foundry practice.

THE EFFECT OF THE PHYSICAL CHARACTERISTICS OF A RAILWAY UPON THE OPERATION OF TRAINS.*

II.

TONNAGE RATING FORMULA AND DIAGRAM (DIAGRAM 3).

This formula has been derived in order to show the uniform velocity at which any locomotive will pull any train up any grade. The diagram has been constructed for Consolidation locomotives Class C $\frac{22}{30}$ — 187 (simple consolidation engine, 57-in. diameter drivers, 22-in. diameter cylinders, 30-in. stroke, 187,000 lbs. on drivers, 200 lbs. boiler pressure, weight of locomotive and tender 340,000 lbs.). Example: This locomotive will haul a train of 2,000 M's at a velocity of 25 miles per hour on six-tenths per cent. grade, or the ruling grade (say the grade at which the velocity is 10 miles per hour for this 2,000 M's) will be 1.45 per cent.

VELOCITY, TIME AND DISTANCE FORMULAS AND DIAGRAMS (DIAGRAMS 4 AND 5).

These formulas were derived in order to enable us to calculate acceleration, time, etc., of any train over any grade. For the diagram a special engine has been assumed, Class C $\frac{22}{30}$ — 187, and a load of 2,000,000 lbs. behind the tender has been taken. Two diagrams have been plotted:

(1) Diagram 4.—A train has been assumed as approaching any grade at 35 miles per hour, and the resulting behavior of the train is shown.

Example (a): Train approaching a two per cent. grade with an initial velocity of 35 miles per hour at a distance of 3,000 ft. has its velocity reduced to 10 miles per hour, and the time in transit over this 3,000 ft. is one minute forty seconds.

Example (b): Train approaching a two per cent. grade with initial velocity of 20 miles per hour will have its velocity reduced to 10 miles per hour in (3,000 — 1,800) = 1,200 ft. in (1 min. 40 sec. — 45 sec.) = 55 seconds.

*From Bulletin No. 112 of the American Railway Engineering and Maintenance of Way Association, June, 1909.

(2) Diagram 5.—The same train with the same engine has been assumed to start from rest.

Example (c): A train starting from rest on a level track, after running a distance of 5,900 ft., will have acquired a velocity of 32 miles per hour, with a time in transit for this 5,900 ft. of three minutes and ten seconds.

(Example (d): A train starting at 20 miles per hour on a level track will acquire a velocity of 30 miles per hour at a distance of (4,300 — 1,100) = 3,200 ft. in (2 min. 30 sec. — 1 min. 8 sec.) = 1 minute 22 seconds.

(3) As the purpose of this paper is merely to indicate a method, we have considered the simple engine only; but a similar process with a change of constants can be used for compound engines.

In this case, a line showing the ratio of mean effective pressure to boiler pressure for the high-pressure and low-pressure cylinders each should be obtained, from which proper constants may be had. The result would be that wherever "d" (cylinder diameter) appears in the preceding formulas there would appear instead the diameters of the

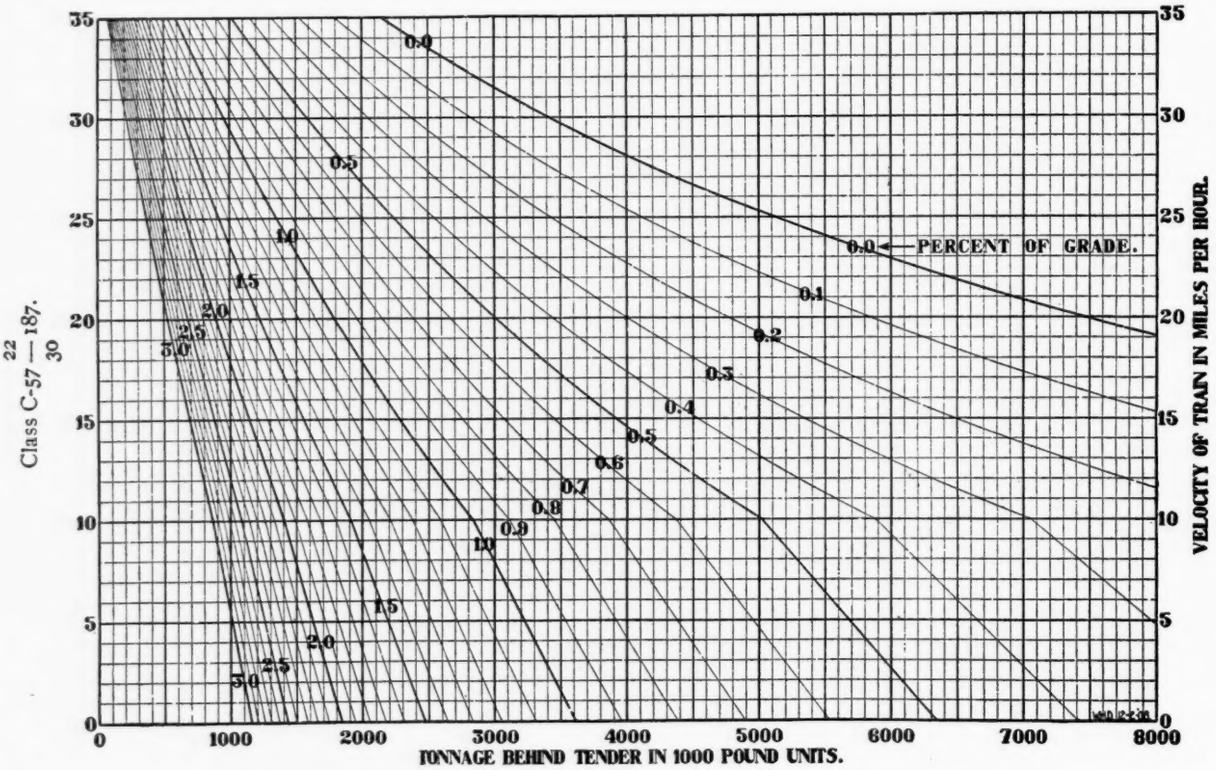


Fig. 3—Tonnage Rating Diagram; Heavy Consolidation Locomotive.

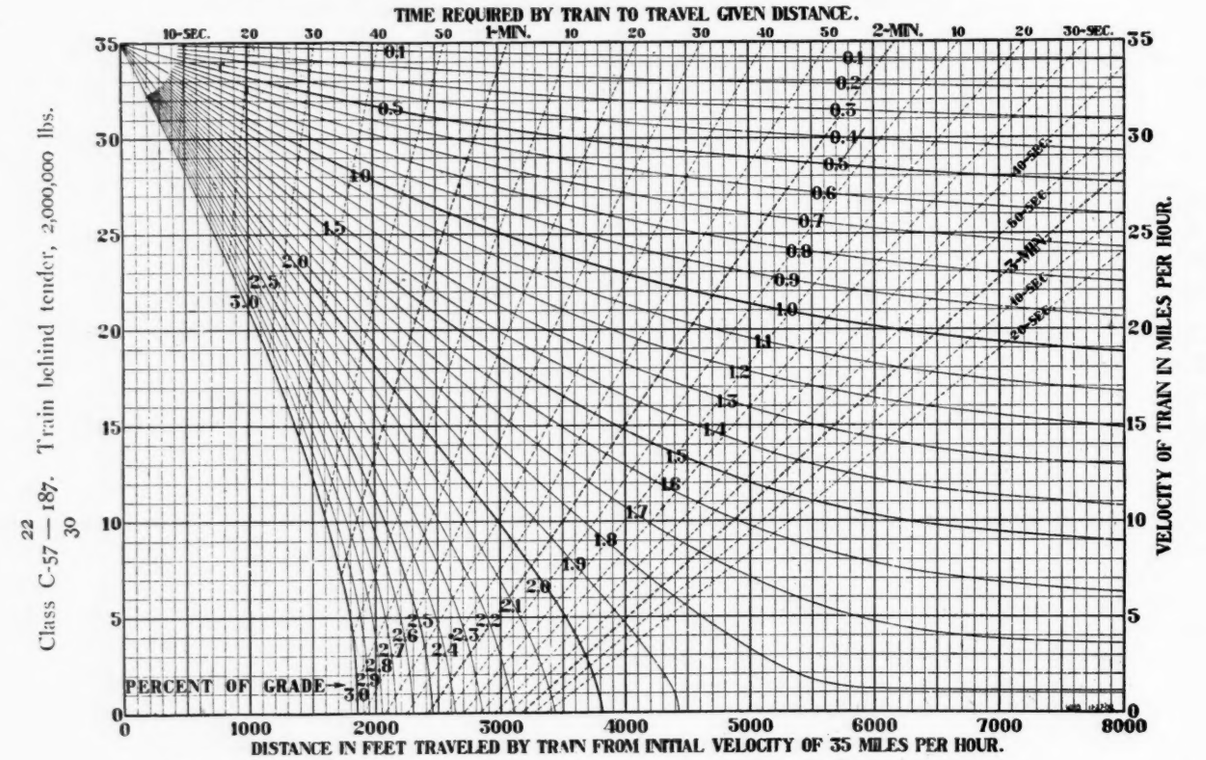


Fig. 4—Velocity, Distance and Time Diagram; Heavy Consolidation Locomotive.

high and low pressure cylinders, with corresponding changes in the accompanying constants.

(4) It will be seen that from these two diagrams, or rather from the formulas which they illustrate, that we may take any locomotive, assume any train behind the same, and predict its velocity, under any conditions, together with the time in transit.

The following example illustrates the use of the various formulas for obtaining required solutions arithmetically, without diagrams:

Assume a Mogul Engine.

Boiler pressure = B = ...200 lbs.
Diameter cylinder = d = ...20 inches.
Diameter of drivers = D = ...63 inches.
Length of stroke = L = ...28 inches.

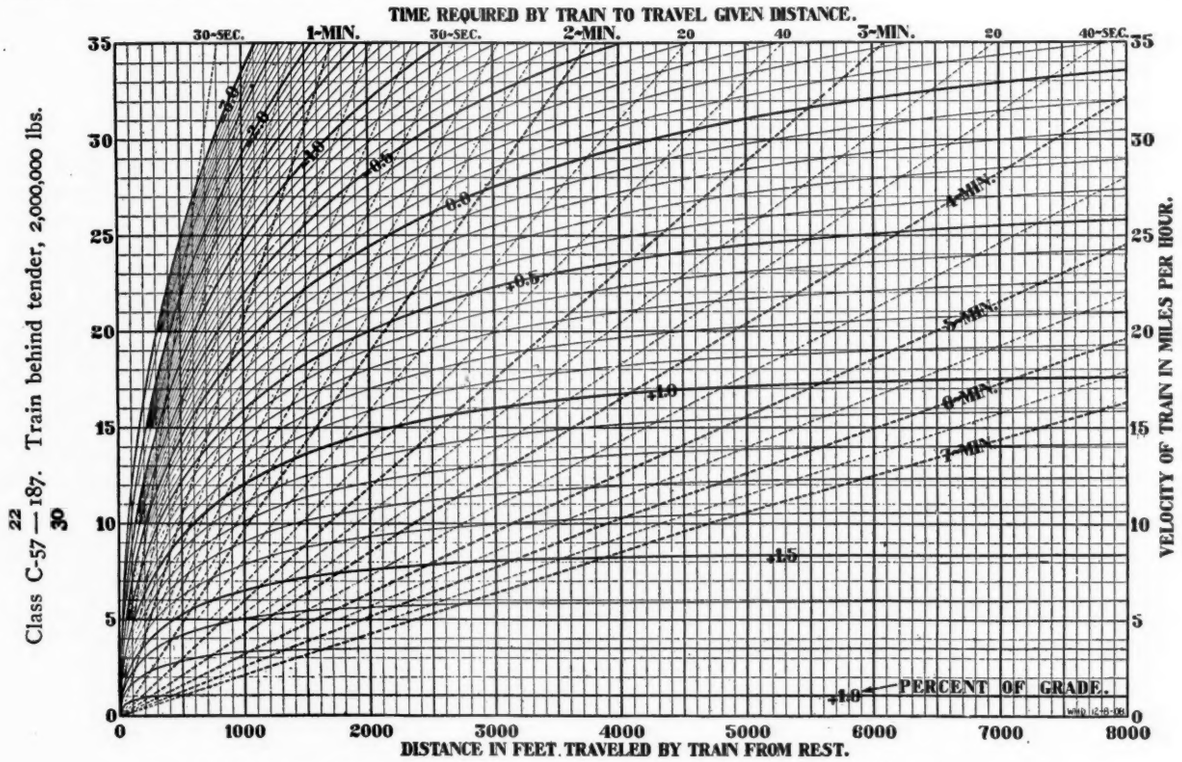


Fig. 5—Velocity, Distance and Time Diagram; Heavy Consolidation Locomotive.

TIME TABLE										
2-MIN. 48-SEC.	9-MIN. 7-SEC.	18-MIN. 12-SEC.	19-M. 20-S.	20-M. 26-S.	23-MIN. 24-SEC.	25-MIN. 52-SEC.
2-MIN. 48-SEC.	6-MIN. 19-SEC.	9-MIN. 5-SEC.	1-M. 8-S.	1-M. 6-S.	21-S	2-M. 37-S.	1-M. 43-S.	43S.

TIME TABLE.

Total time = 25 min. 52 sec.
Average speed = 16.3 m. p. h.

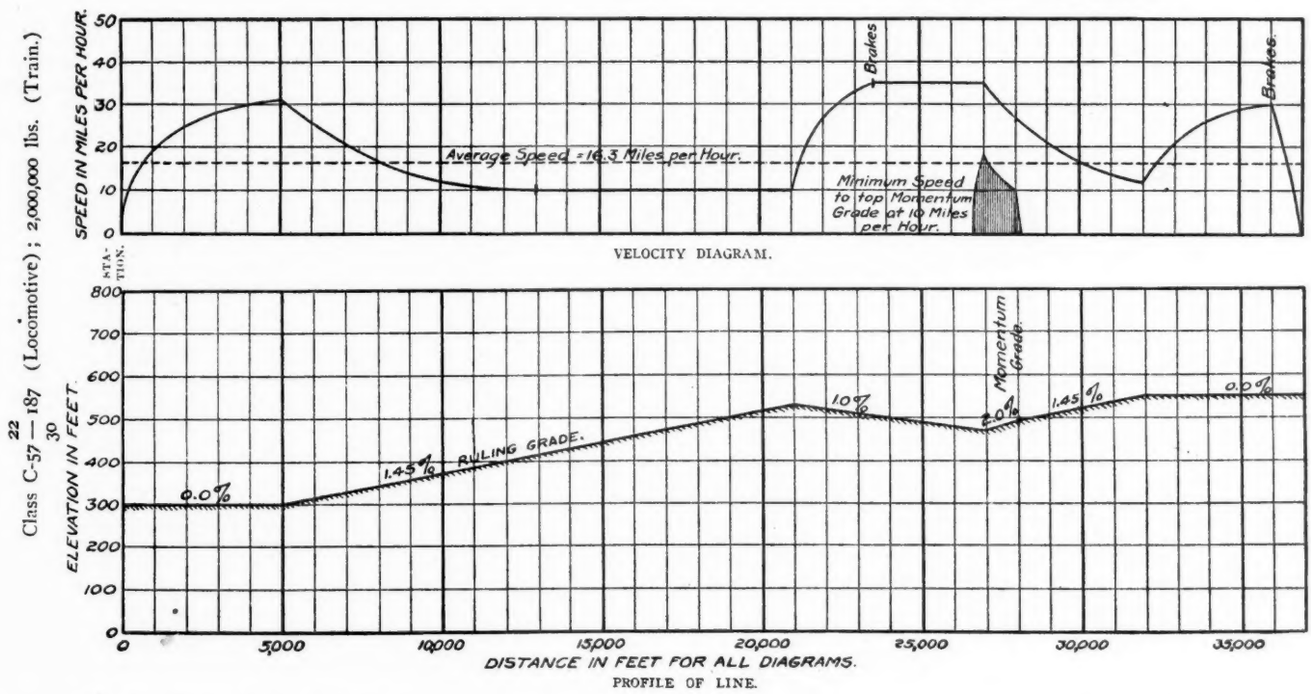


Fig. 6—Sample Profile, Showing Distance, Velocity and Time, from Tonnage Rating Formulas and Diagrams.

$$\frac{L}{D} = C \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \frac{4}{9}$$

Weight of train behind tender.....2,800,000 lbs.
Weight of locomotive and tender..... 300,000 lbs.

Total weight W =.....3,100,000 lbs.

Assume initial speed of train = V_0 of 30 miles per hour entering a 1.5 per cent. grade = G.

Problem.—To show behavior of train until it comes to rest:

Distance

$$S = \frac{-734.8W}{K}\left\{V_0 - V_1 + 2.3\frac{A}{K}\log.\left|\frac{\frac{A}{K} - V_0}{\frac{A}{K} - V_1}\right|\right\}$$

When $\begin{cases} A = 10\,450\,d^2CB - 110WG - 24\,75W \\ K = 392\,C^2d^2B \end{cases}$ for V = 0 to V = 10

$\begin{cases} A = 10{,}450\,d^2CB - 110\,WG - 8.25\,W \\ K = 392\,C^2d^2B + 1.65\,W \end{cases}$ for V = 10 to V = 35

Substituting above values, we obtain:

$\begin{cases} A = -221{,}670{,}000 \\ K = \quad 6\,190{,}000 \end{cases}$ for V = 0 to V = 10

$\begin{cases} A = -170{,}520{,}000 \\ K = \quad 11{,}310{,}000 \end{cases}$ for V = 10 to V = 35

$\begin{cases} \frac{A}{K} = -35.81 \text{ for V} = 0 \text{ to V} = 10 \\ \frac{A}{K} = -15.08 \text{ for V} = 10 \text{ to V} = 35 \end{cases}$

Substituting in formulas for S, we get:

$S = -368\left\{V_0 - V_1 - 82\,23\log.\left[\frac{-35.81 - V_0}{-35.81 - V_1}\right]\right\}$ for V = 0 to V = 10

$S = -210.5\left\{V_0 - V_1 - 34.68\log.\left[\frac{-15.08 - V_0}{-15.08 - V_1}\right]\right\}$ for V = 10 to V = 35

which will solve any question of space and velocity for this particular engine hauling the assumed train on the assumed grade.

If such train approach 1.5 per cent. grade at 30 m.p.h.

(1) Where will it get down to 10 miles per hour?

(2) Where will it stop?

(1) $V_0 = 30$, $V_1 = 10$. Substituting, we get

$$S = -210.5\left\{30 - 10 - 34.68\log.\left[\frac{-45.08}{-25.08}\right]\right\}$$

$= -2{,}257$ ft., at which velocity of train will be 10 m.p.h.

(2) $V_0 = 10$; $V_1 = 0$, and substituting, we get S = — 441 ft., which is distance train will run from 10 m.p.h. to rest.

Total distance run from foot of grade = — (2,257 + 441) = — 2,698 ft.

The distances are negative because retarding forces exceed accelerating forces.

Time

$$t = -\frac{19.2\,W}{K}\left\{\log.\left|\frac{\frac{A}{K} - V_0}{\frac{A}{K} - V_1}\right|\right\}$$ A and K same as above.

(1) In what time will speed be reduced to 10 m.p.h. or train travel the 2,257 ft.?

(2) In what time will speed be reduced to 0?

(1) $t = 5.25\log.\left\{\frac{-15.08 - 30}{-15.08 \quad 10}\right\} = 1.34$ min. = 1 min. 20.4 sec.

(2) $t = 9.6\log.\left\{\frac{-35.81 - 10}{-35.81 - 0}\right\} = 1.03$ min. = 1 min. 1.8 sec.

Total time = 2 min. 22.2 sec. for train to run 2,698 ft. and come to rest from 30 miles per hour initial speed on a 1.5 per cent. grade, with the locomotive exerting its full traction corresponding to its speed at all times.

DISTANCE, VELOCITY AND TIME DIAGRAMS FOR ANY PROFILE. (DIAGRAM 6.)

With the sample profile shown, the train is assumed starting from rest on a level track using the same engine and train for which the former diagrams are plotted. After proceeding 5,000 ft. the train has reached a velocity of about 31 miles per hour, when it strikes a ruling grade of 1.45 per cent. Velocity drops to 10 miles per hour in a distance of about 8,000 ft., as computed, and proceeds at this velocity until it strikes a 1 per cent. down grade. From the diagrams we will see that it reaches a velocity of about 35 miles per hour at a distance of 2,600 ft., at which point the brakes are applied (or steam shut off), proceeding at this velocity until it strikes a 2 per cent. momentum grade 1,000 ft. long. From the diagram it will be seen that the velocity drops to about 26½ miles per hour. The train then enters upon a 1.45 per cent. grade for a distance of 4,000 ft., and it will be seen from the diagrams that it reaches a velocity of about 12 miles per hour. On the next 4,000 ft. of level track the diagram shows that the train will reach a velocity of 30 miles per hour, at which brakes are applied and steam shut off to stop for station 1,000 ft. ahead. Under the velocity curve for the 2 per cent. momentum grade is shown another velocity curve showing the minimum velocity inside the shaded section at which the train will safely top the grade at 10 miles per hour; that is, on approaching the grade the train must have acquired a velocity of 18 miles per hour in order to go over the summit of the grade at 10 miles per hour. If this train should stop inside this shaded section it could not start on the grade, but would have to back up to a point at least 500 ft. back of the grade and get a start. The top timetable shows the time the train requires to pass over corresponding distances at the velocity shown, these various times being read off the diagrams when within their limits, computed beyond their limits, and computed for the sections where the velocity is uniform. From the tonnage rating formula and distance and time formulas we may construct such a velocity diagram and timetable for any locomotive hauling any train over any given profile.

We have used the actual velocity of the train in the computations and diagrams rather than the "velocity head," for the reason that to the average reader the actual velocity of the train we believe is more significant that the "velocity head," and is equally convenient to use.

METHOD OF COMPARING THE OPERATING COSTS OF TWO OR MORE PROPOSED RAILWAY LINES.

A profile of the proposed line should be obtained at a sufficiently large scale to show all grades of any importance in addition to the ruling grades. The lines considered should be divided as nearly as possible into probable operating districts, these districts representing the ordinary run of through trains without change of equipment, or remaking up of trains, say, something like 100 miles. Each division should now be considered separately, as follows:

Pick out a common type of engine, and from tonnage rating formula and ruling grade compute the rating for this engine on ruling grade for the usual speed in such cases, say 10 miles per hour. By the use of velocity, time and distance formula (or diagrams) we may predict the timetable time for this district, making proper assumed allowances for stops at stations.

Length of division equals train miles for the train assumed for the time assumed. Dividing by the number of thousand M's in the train will give us train miles per thousand M's for the time in transit. Dividing this result by 24 and multiplying by the time in transit will give us *train-mile days* to haul 1,000 M's over the district.

Repeating this calculation for all of the districts assumed,

and adding the results together, we will have train-mile days required to haul 1,000 M's over the entire road. Getting the same results for the road or roads which we wish to compare, we may get the ratio between the train miles required on each road to haul the same amount of freight in the same time. Of course we have the physical length of each road in addition as an operating factor.

From an analysis of auditor's reports on one of the Harriman Lines we deduce that 38.5 per cent. of the total operating expenses are affected by the length of line, and that 30.6 per cent. of the total operating expenses are affected by locomotive mileage (or train mileage), we may apply these percentages and obtain a direct comparison of the operating costs of each road.

It would seem that this method very nearly represents the actual operating conditions under similar conditions in that it shows the actual effect of grades upon the load hauled and the speed of train.

For refined calculations, grades should all be compensated for curvature. The following is a simple example worked out in detail from assumed quantities:

COMPARISON OF OPERATING COSTS OF LINE I VS. LINE II.

First Line.

Operat'g district.	Length of district in miles.	Ruling grade. *Per cent.*	Rating in M's.	Time over district. *Hours.*	Train-miles per 1000 M's.	Train-mile days per 1000 M's.
A	100	1.5	1,900	6	52.7	13.15
B	120	1.0	2,800	5	42.9	8.95
C	110	2.0	1,400	6	78.5	19.50
D	150	1.0	2,800	7	53.6	15.60
Total	480	....	....	..	....	57.20

A similar tabulation must be made for Line II.

Locomotive assumed, heavy Consolidation C-57 — 187, 200 lbs. boiler pressure.

	Line I.	Line II.
1. Total distance in miles by each route	480.00	470.00
2. Train-mile days per 1,000 M's	57.20	70.00
3. Distance on basis of Line I = 100%	100%	98.0%
4. Exceeds Line I	0%	—2.0%
5. Applying 38.5% to (4)	0%	—0.77%
6. Train-mile days basis, Line I	100%	122.5%
7. Exceeds Line I	0%	22.5%
8. Applying 30.6% to (7)	0%	8.1%
9. Combining (5) and (8) gives comparative difference in cost of operation	0%	7.33%
10 Cost of operation basis, Line I = 100%	100%	107.33%

It is evident, of course, that the above comparison is simply from a theoretical standpoint and assumes that the two lines are somewhat similar. If one line should have long trestles, snowsheds, or any characteristics which rendered its maintenance and operation particularly high compared with the other line, these features may be a controlling factor in the decision.

APPENDIX.

Below is an analysis of the effect, first, of length of line; second, locomotive mileage; upon the cost of railway operation, based upon auditor's report for one of the Harriman Lines:

COST OF RAILWAY OPERATION.

Table A.

Classification:	Operating expenses. *Per cent.*	Not affected by length of line. *Per cent.*	Affected by length of line. *Per cent.*
Maintenance of way	24.97	1.52	23.45
Maintenance of equipment	20.53	20.53	....
Traffic expenses	2.71	2.71	....
Transportation expenses	47.51	32.49	15.02
General expenses	4.28	4.28	....
Total	100.00	61.53	38.47

Table B.

Classification:	Proportion of expense. *Per cent.*	Not affected by locomotive mileage. *Per cent.*	Affected by locomotive mileage. *Per cent.*
Maintenance of way	24.97	22.42	2.55
Maintenance of equipment	20.53	12.20	8.33
Traffic expenses	2.71	2.71	....
Transportation expenses	47.51	27.75	19.76
General expenses	4.28	4.28	....
Total	100.00	69.36	30.64

The above may vary with different lines, and is given only as an example of the method pursued in the foregoing article, in arriving at coefficients for comparison.

SPECIFYING AND INSPECTING LUMBER.*

It is useless for buyers to prescribe arbitrary specifications and grading rules which do not conform to the standard rules adopted by the manufacturers, because as a rule the manufacturers pay no attention to such specifications. Railway buyers must adapt themselves to the commercial grades. In other words, we can make a shoe fit the foot, but we cannot make the foot fit a shoe. As it is now, it frequently happens that buyers are paying for a certain grade of lumber but actually get a lower grade. For example, I know of some roads buying "B," and better, car siding, but actually get No. 1 common, which is worth several dollars less per thousand, and the fact is not detected because the specifications are not well understood by their inspectors. Again, I know of some cases where the purchasing agent has paid a premium to get car sills or bridge stringers, under impracticable specifications, and got the same grade or quality that other buyers bought at a lower price. He was led to believe that on account of the severity of his specifications he would have to pay a higher price for the lumber. A great saving of time and money could be effected if the Master Car Builders and Maintenance of Way associations would adopt the standard classification and grading rules of the various manufacturers, selecting such grades and kinds of lumber and other materials as may be used by railway companies.

At the present time fully 95 per cent. of the output of lumber is graded and classified according to the lumber manufacturers' rules, and all quotations are made on them as a basis. It is very essential that purchasing agents should familiarize themselves with these rules in order that they may know what they are contracting for. Also, these specifications and rules would serve as a guide to inspectors in determining what is and what is not up to grade, no matter whether the lumber is inspected at shipping point or at destination.

Mr. McCarthy advocates destination inspection. I believe inspection at the mill or shipping point is preferable. A saving of $1 to $2 per thousand in favor of destination inspection is imaginary. The cost of inspection of lumber at mills, when bought in large quantities, runs from 50 cents to 75 cents per 1,000 ft. The cost of inspection of cross ties on the New York Central Lines West of Buffalo averages less than one cent per tie, which is equivalent to nearly 35 cents per 1,000 ft., board measure. This includes the wages and traveling expenses of inspectors. The inspector at mills or shipping point should be under the direction of the purchasing agent. It is the purchasing agent's duty to see that he gets the quality of lumber that he buys, and in order to prevent the shipment of any inferior grades or quality of lumber and to avoid the numerous complaints coming from destination inspection, he should have his inspector at the mills.

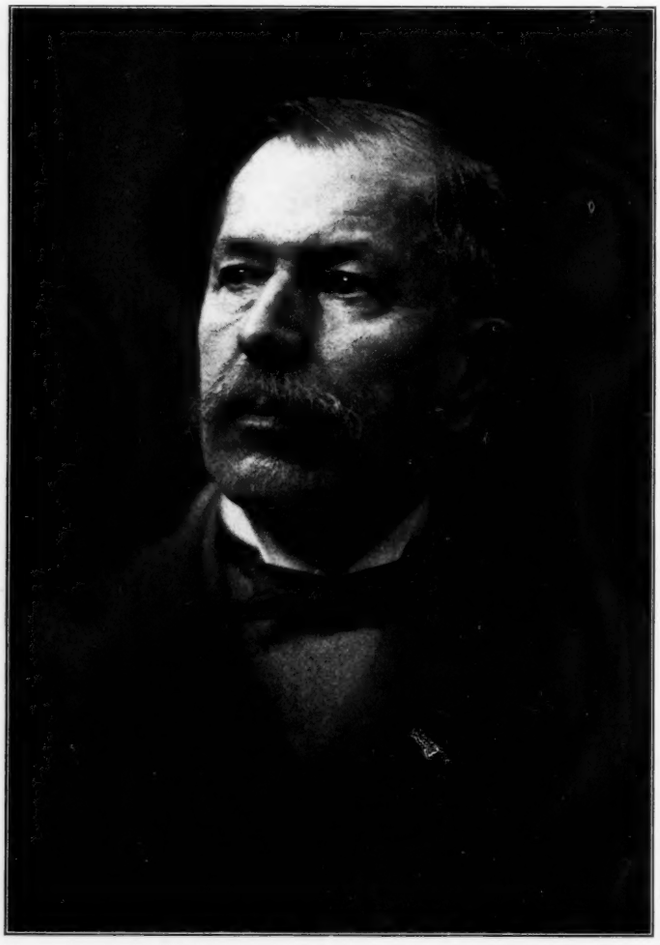
When I took charge of the purchase of cross ties on the New York Central Lines I discovered that the inspection service was very unsatisfactory. Some of the lines comprised in the system had been getting inferior ties for many years, and there seemed to be no way to stop it. In many cases shipments were made subject to inspection at destination, and, as might be expected, cull ties could be found in large quantities scattered from one end of the road to the other. I also discovered that one or two of the lines awarded large contracts to one or two prominent tie contractors who exercised a good deal of influence over the inspectors and even dominated and controlled them. I also discovered that some of the inspectors bought ties for the general contractor, on a commission, and

*From comment by W. F. Goltra, General Tie Agent of the New York Central Lines, on the paper read by J. M. McCarthy, Purchasing Agent of the Rock Island, before the Railway Storekeepers' Association.

afterward inspected them for the railway company, getting pay for their work from two sources. I also discovered the fact that some inspectors gave certificates of inspection to shippers for ties which they had never seen. I soon became convinced that the trouble was not so much with the inspectors as with the lack of systematic check on their work and adequate organization of the inspection service as a whole. During the first few months of my administration I received upward of 175 complaints per month of bad inspection. I proceeded to weed out the dishonest inspectors and reprimanded others, and adopted methods which gave me a complete check on the work of each man. Each and every tie is critically examined at the time it is loaded on the car. No ties are inspected in piles, on the right of way, or at other places. Every tie is branded by the inspector, who has an individual hammer, at the time the tie is accepted and loaded. After working a year or more under this system I am able to state that I am receiving on an average only four complaints per month.

During the fall and winter season we employ thirty to thirty-five inspectors, and during the spring and summer twenty to twenty-five inspectors. These inspectors are trained men in their profession and they know the various kinds of woods and the value of a tie the moment they see the tie. They know from experience what is required and usually have enough judgment to interpret the specifications correctly. Section foremen, roadmasters and division engineers on our system have been provided with copies of the standard specifications for ties and are supposed to inspect and count the ties upon arrival, and should the quality or quantity disagree with the inspector's certificate they are expected to report the fact through proper channels to the chief engineer, who in turn advises me. Upon receipt of complaint from the chief engineer I demand an explanation from my inspector and not from the shipper, as the certificate which my inspector gave the contractor or shipper is final and conclusive, and the railway company is obliged to stand the loss. The shipper or producer is punished by our refusing to buy any more ties from him, and inspectors are instructed not to accept any more ties that he may offer on any of our contracts.

The inspectors' wages range from $75 to $100 per month and their expenses. I do not find that any of them are "hampered" or influenced by mill men or producers. Most of my men have a mind of their own, and generally tell the mill man or producer, if he attempts to interfere, that they know their own business. I find these inspectors just as anxious to do their work properly and retain their situations as any member of this association is. I heard it said that we could not expect a man to be honest when he only got $75 or $100 per month and expenses, and if he inspected lumber or ties at shipping point he would be very apt to be bribed by the mill man or producer. So it was argued that the material should be inspected at destination, where he would be removed from that evil influence. I told that person such an argument has but little weight. I do not believe that wages make any difference. If a man is naturally dishonest, he will be dishonest at any salary.



Leffert L. Buck.

LEFFERT LEFFERTS BUCK.

Leffert Lefferts Buck died at his home at Hastings-on-the-Hudson, N. Y., on July 17. Mr. Buck had to perhaps an excessive degree that high type of courage which is essential in an engineer who designs and builds great works. We often say that the engineer must have imagination in that sense of the word which means the ability to find the solution of great problems and make a mental picture of the correct result of the study. A capacity for making original investigation is perhaps more descriptive and less liable to give a wrong impression, for no one of the many who knew and admired Buck would think of laying stress on his imaginative qualities in a literary or artistic sense. Indeed, we do not recall any of his many great constructions that do not in their outlines more or less offend the artistic eye. Buck was accustomed to these criticisms, and usually replied in only one way: "It is strong." Few people can look at the towers of his Manhattan bridge without a feeling of regret, and yet they are simple, strong and on economical lines. His drawings and his structure were severely criticized by those for whom he had great respect; nevertheless, nothing that they could say swerved him. When he believed he was right his courage took the form of obstinacy.

Although he built many other important bridges, his title to fame, which will endure in the history of engineering, is his extraordinary work from 1877 to 1886 in successive reconstructions of the famous suspension bridge at Niagara. He did what no other responsible engineer apparently dared to do, and they all had a chance. This railway suspension bridge was built in 1853-1855 by John A. Roebling, and was then without precedent. In 1877 corrosion was discovered in the outside layers of wires in the cables at the anchorages. Buck replaced these wires and reinforced the anchorages. In 1880 he renewed the stiffening trusses, substituting metal for wood and carrying out the work in a brilliant way. In 1886 he removed the original stone towers and substituted steel towers without interrupting traffic, and this made him famous throughout the whole engineering world. The undertaking was at the time a startling one, and when it was projected and during the whole period of carrying it out, it was carefully watched by members of his profession, both abroad and at home. Indeed, the attention given to it and the amount written about this work by foreign engineers

was much greater than was the case in the United States.

It is not unusual to find among stubborn, hard-headed men an unusual development of kindliness, even to a degree which might be called soft-heartedness, and this was true of Buck. He loved his friends dearly, and loved to confer with them about their own and his difficult problems. He did not hesitate to ask for advice, but the writer has no knowledge of any instance where he accepted advice.

He was born in Canton, N. Y., in 1837. Following an early bent for mechanics, he was apprenticed for three years in a machine shop, and followed this with a year and a half as a journeyman machinist. He prepared for college in Canton Academy and entered St. Lawrence University in 1859 with its first class, but left it two years later to go to the war. He was mustered out in 1865 with the rank of captain.

After the war he entered Rensselaer Polytechnic Institute, and was graduated as an engineer in 1868. He served for three years as assistant engineer in the Croton Aqueduct department of New York, then went to South America, where for two years he worked at railway and bridge building in Peru. The Verrugas viaduct, then the highest bridge in the world, was erected by him. He returned to the United tSates for two years, then spent another period in Peru. In 1880 and 1881 he was resident engineer of the Central New Jersey. In 1882 he did some work for Mexican railways. After a year with the Northern Pacific he formed a partnership with George McNulty, continuing with him till 1888, since which time he practiced alone. After 1889 he gave much study to the problem of bringing the Pennsylvania into this city by means of tunnels. In 1895 he became chief engineer of the East River bridge commission. At the time of his death he was in charge of the construction of the Manhattan bridge over the East river, New York. He was a member of the Intercontinental Railway Commission, representing Peru and Ecuador, and a member and former director of the American Society of Civil Engineers.

FOREIGN RAILWAY NOTES.

The Tauern Railway, through the Central Austrian Alps, which was begun in 1901, was opened through July 5. This gives the shortest route from western Austria and southern Germany to the Adriatic, and for many places it reduces the distance one-half.

For the third time in five years the Marseilles sailors have gone on strike, totally interrupting the traffic with Algiers, which as "domestic commerce" is limited to French vessels, and this at a time when early fruits and vegetables, which cannot wait, and fat sheep, which don't want to, should be coming forward in great quantities. This makes an opportunity for Genoa, whose vessels, being engaged in foreign commerce, can carry Algerian produce; but this is too indirect for much of it, and it has been proposed to suspend the navigation laws in cases like this and let foreign vessels ply directly between Algiers and Marseilles.

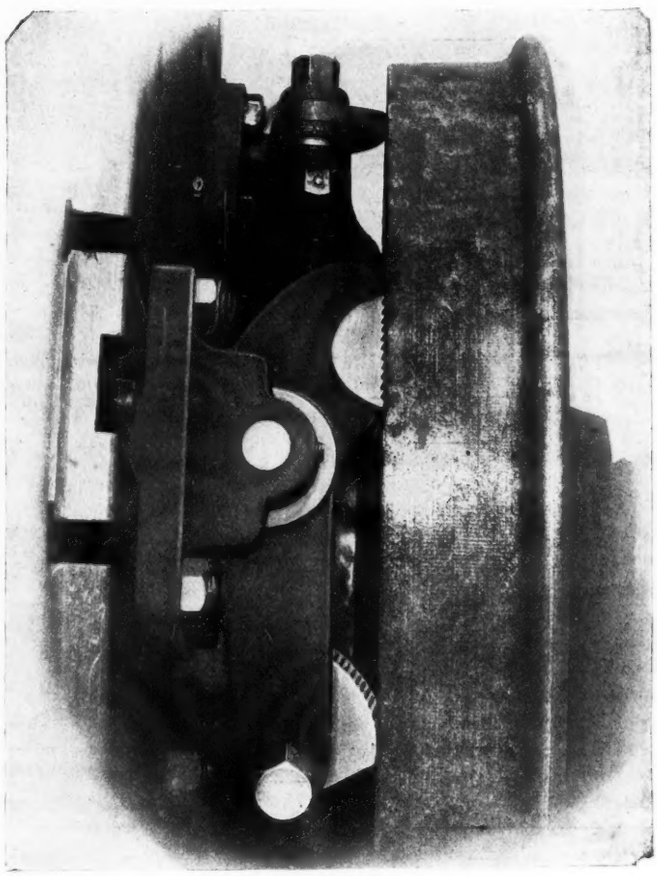
The railway in German East Africa from Dar-es-Salaam westward to Morogoro, which is about 7 deg. south of the equator, has issued its traffic statistics for 1908, when it was 130 miles long, having since been extended to Kilossa. In this year it carried 38,676 negro passengers and 3,963 whites, traveling on the average 77 miles each. This is equivalent to an average movement of 34⅓ persons each way daily over the whole line. The colored people paid at the rate of 0.51 cent per mile; the whites, enough more to bring up the average for all to 0.77 cent per mile. This made the gross passenger earnings $25,499, or $196 per mile, besides which about $3,150 was taken in for carrying passengers' baggage, bicycles and dogs. This road also carried 13,364 tons of freight in the year, nearly two-thirds of it being materials for the extension of the road, by which it earned $66,706, or $511 per mile, and 1,623 head of cattle, big and little, which yielded $464. The total net earnings for the last half of the year were $2,858, or $22 per mile. This, as well as the other figures, indicate that the road is, as it were, a missionary enterprise, the mission being to develop the vast country between Lake Tanganzika and the Indian ocean. So far it develops very slowly. The road has cost so far $32,333 per mile.

SELLERS 42-IN. CAR WHEEL LATHE.

About a year ago (June 5, 1908) a description was published in the *Railroad Age Gazette* of a driving wheel lathe that had, at that time, just been brought out by the William Sellers Co., Philadelphia, Pa. It will be remembered that the time required for turning a pair of 78-in. drivers from floor to floor with this lathe was 35 minutes. Since that time work has been done in modifying the tool to adapt it for the somewhat different requirements for turning of car wheels. The result has been the development of a 42-in. car wheel lathe, which has a capacity fully up to that of the driving wheel lathe as far as weight of cut and speed of operation is concerned, but which is essentially different in many of the details which have been correspondingly simplified.

In broad general principles the two lathes are the same. That is to say, both are driven by an electric motor, bolted to the bed; in each, one head is stationary while the other is movable, and a turret is used for holding the tools. Beyond this there are many resemblances in detail as well as many differences.

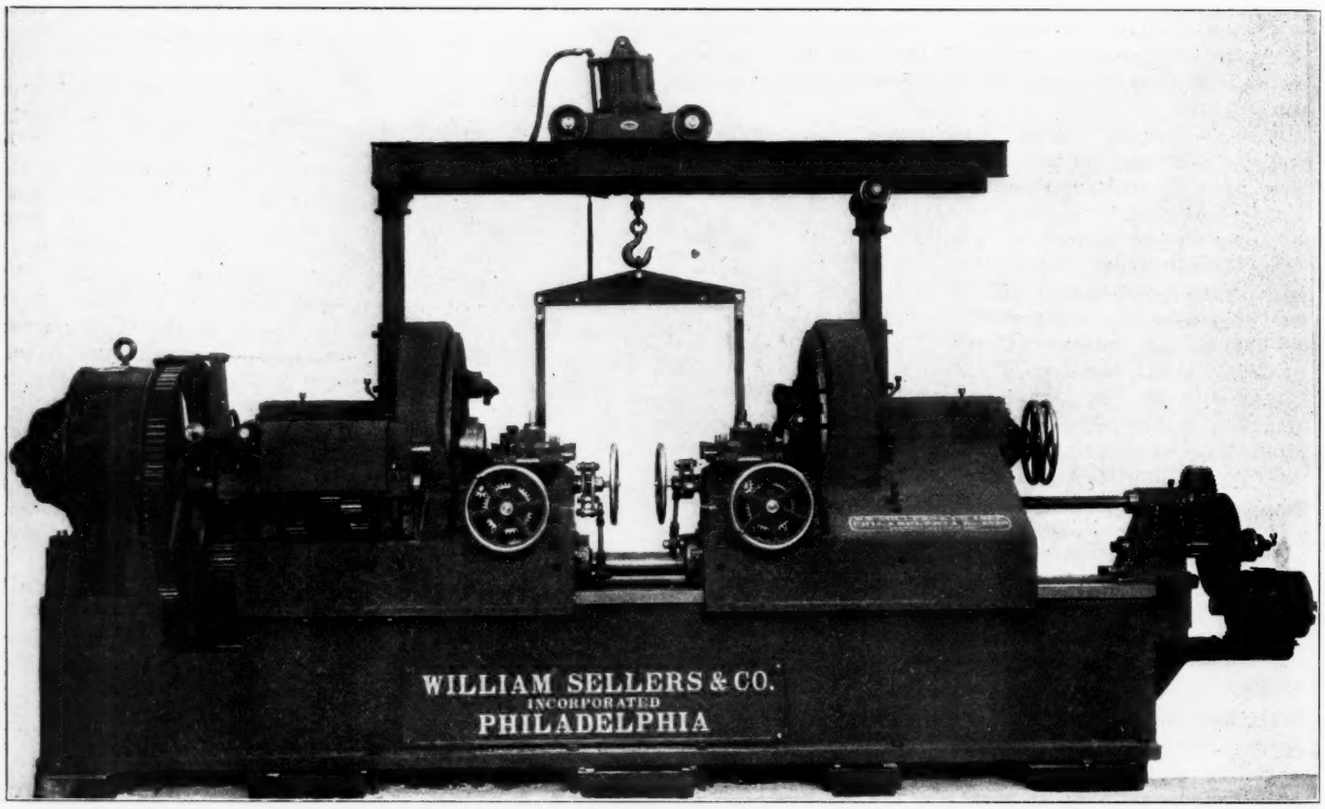
In the driving wheel lathe the motor was mounted at the



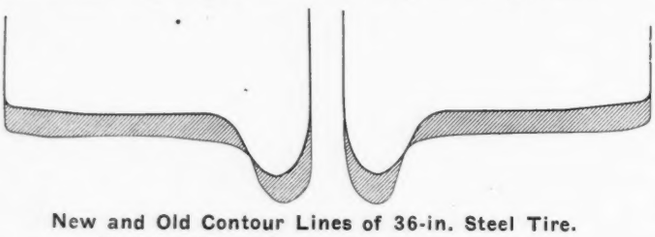
Driving Dog of Sellers Car Wheel Lathe.

back of the headstock. In the car wheel lathe it is set down on an extension of the bed. The armature pinion drives a large gear, upon whose shaft the change pinions are mounted. These are of different diameters, and according as one or the other of them meshes with a corresponding gear on the intermediate shaft, the speed is fast or slow. In addition to these two mechanical changes, the range of speeds can be widely varied through the controller of the variable speed motor that is used.

The shaft runs along the bed and carries pinions for driving the two face plates, one being fixed and the other traveling with the back head, and both meshing in the ordinary manner with their respective gears. The spindles used in the two heads are somewhat novel and deserve especial attention. It must be borne in mind, in the first place, that the lathe must be adapted to taking wheels pressed on axle with both inside and outside bearings. Then in order that the typical drive from the rim of the wheel may be used, without an excessive overhang, it is necessary that axles with an outside bearing should project into the spindle and that a center should project from the face plate to carry wheels with inside bearings. Further than this it was desirable, in order to avoid excessive wear on the centers, that they should turn with the wheel and so be driven much tighter than is possible with the ordinary dead center. In order to meet these conditions the spindle is made hollow and for a depth sufficient to admit the journal and collars of the M. C. B. car axles with plenty of room to spare. The inner diameter is tapered from 9 in. to 7¾ in. in the 12 in. from the end. In order to carry the axle an expanding bushing is set over the journals, in the form of a centering cone. It consists of a shell, cut into three segments, each having a bearing strip at each end that is turned to the same taper as the inside of the spindle. One of these segments is tied to each of the others by connections with slotted holes, so that the pieces are free to move in and out. The whole combination is then wrapped with two turns of a spiral spring, after the manner of a clock spring, that is put in place under tension, and so tends to draw the pieces together and make them clamp the journal. The unconnected opening between the second and third segments makes it possible to easily spring the parts open and slip them over the axle collar. The whole is then inserted in the spindle and the latter run home by moving the back head up to the running position. In the case of wheels and axles with inside bearings, a center is put in the spindle that projects far enough beyond the face plate to take the axle. In other respects the action is the same as with the outside journals.



Sellers 42-in. Car Wheel Lathe.



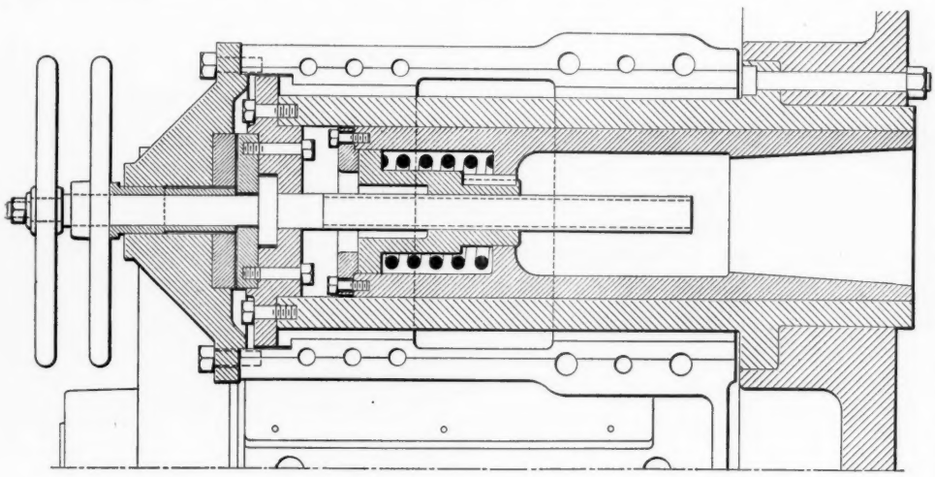
New and Old Contour Lines of 36-in. Steel Tire.

Shaded portion indicates metal removed to finish. Roughing cut, ⅜-in. feed.

This arrangement would undoubtedly hold very securely if everything were to be made solid, but there would be danger of jamming and breakage in case the head were moved up too far. To obviate this danger the back thrust of the spindle is taken by a helical spring of ¾-in. steel. This spring is seated in a chamber at the back end of the spindle and bears against a gland-shaped sleeve that forms a nut for the setting-out screw, and which is keyed to the spindle itself so that it cannot turn. This screw is set up until the spring has an original compression of 2 in., in which condition it exerts a pressure of 1,200 lbs. against the spindle. The latter is made to a close fit in its housing, as it takes nearly this amount to move it to and fro, the idea being to permit the head to press the driving dogs against the rim of the wheels without increasing the pressure on the bushing, and also to maintain the pressure on the bushing even if the head should spring apart

under the strain of the cut, and this, together with its own weight and that of the wheel and axle, is sufficient to prevent it from turning with the screw. It has an ultimate compression of 4 in., giving an ample leeway to prevent jamming. The final back thrust of both spindle and drivers is taken by two steel plates: one of these is bolted to the back end of the main spindle of the face plate, and this also takes the back thrust of the collar on the screw. Then a second and stationary plate fastened to the headstock takes the full thrust. Ordinary oil lubrication is used. The adjusting screw is turned by a handwheel, and is locked by another wheel having a long bushing extending in to get a bearing against the rotating thrust plate. It is thus a simple check nut. It is not considered to be really necessary, because all parts are rotating, but is used so as to meet a possible demand for such a device.

As is the case of the driving wheel lathe, the back head is moved back and forth each time for the removal and placing of a pair of wheels. This is done by a screw driven by an electric motor, as shown in the engraving. This motor drives the screw through the friction clutch, which is adjusted to slip when a sufficient pressure has been brought to bear on the wheels and axle. In fact, it is the slipping of this clutch that is made to serve as a proper index of the suitable pressure that has been brought to bear on the wheels. To quote



Spindle for Sellers Car Wheel Lathe.

from the previously published description of the driving wheel lathe: "This clutch is simple, consisting merely of a tapered disk fitting into a corresponding ring cut in the body of the spur gear of the drive and held in place by a strong helical spring shown on the end of the screw shaft. This spring is put under such a tension that it will move the head up against the resistance of the spindle spring and give the suitable pressure to the driving dogs on the face plate."

As in the case of the driving wheel lathe, these dogs are exceedingly simple, but of an entirely different design. The underlying principle is that of a toggle joint. A casting is bolted to the face plate. It has two projecting lugs to take a pin upon which the dog is pivoted. The bearing surface that does the driving is a half circle of hardened steel the flat face of which is cut with teeth. The semi-circle is turned with a dovetailed tongue fitting in a corresponding groove in the lever casting. It turns freely in this groove, so that when it is brought against a wheel rim the whole of this flat surface comes to a bearing. The other end or tail of the lever is bent and carries a cam used to bring all parts to a bearing; and these two points of contact, the driving teeth and the cam, are set on a circle. The tooth circle can be adjusted in and out on the pin by shims, so as to take narrow-rimmed wheels, while the whole dog is adjustable radially to accommodate wheels of different diameters. The cam and the tail is used merely to bring the driving teeth into position, for when the load is on the tendency is for the dogs to dig deeper into the rim of the wheel and thus relieve the pressure on the cam. In practice it has been found that an angle of 45 deg. between the line connecting the pin and the driving dog circle and the face plate is sufficient to obtain a thrust that will drive the wheels under any cut that can be taken. Furthermore, the cam serves another purpose than that of bringing the dog into place. It has no driving effort, so that if the wheel should slip it would turn all of the cams and thus set up the dogs with each of the cams, so that it would be impossible for one to slip while another was digging into the tire and thus springing the wheel. This arrangement insures a uniform drive for each of the dogs.

At the time the design was completed it was thought possible that the great horizontal thrust of the dogs against the wheels might be sufficient to cause them to be pushed in on the axles, but it is not in the slightest degree probable that this can ever occur if experience in the working of the machine is any criterion, for there has never been the slightest indication of a slip. Further than this the maximum horizontal thrust of the dogs is calculated to be never more than 60,000 lbs., as a total maximum, and this is far below the pressure with which the wheels are put upon the axle.

It will be seen from the reproduction of the photograph of the machine that an air cylinder on an overhead lorry is used to hoist the wheels into the lathe.

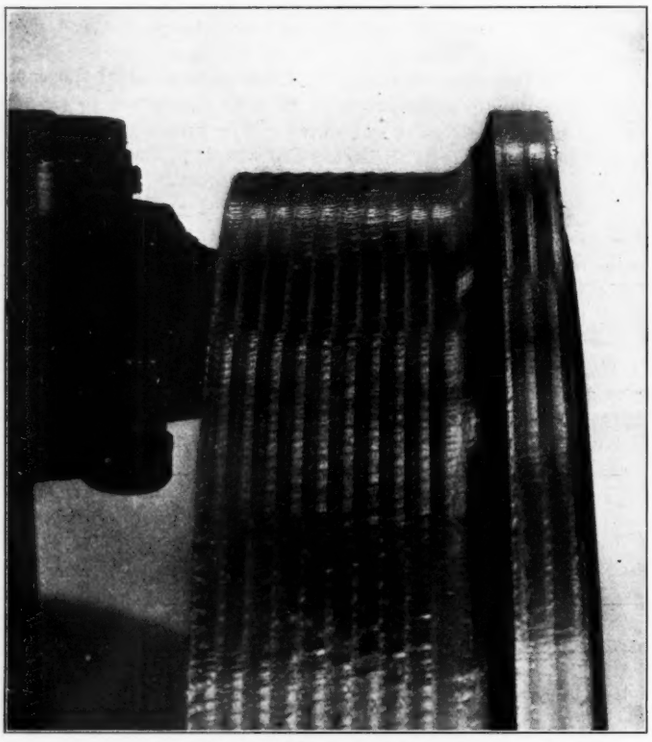
The arrangements for this are very complete. On the base of each head a rib is cast corresponding to the head of a rail. That on the front or main head is set opposite that of one of the rails leading to the lathe. When a pair of wheels has been finished the back head is run back until its rib mates with the other rail of the track. The wheels are then dropped down upon it and rolled away and another pair brought in. Of course, when the lathe is in operation the two ribs are much nearer together than the gage of the track. It is also to be noted that the slide rests are mounted on the heads themselves instead of upon the bed, as is usually the case.

The next great change in the machine is to be found in the construction of the turret. It is exceedingly simple and, as will be shown later by the work done, very efficient. It has the usual cross and longitudinal feed, but, contrary to the common arrangement, and the one obtaining in the driving-wheel lathe, the longitudinal feed is at the top and the cross feed at the bottom. The reason for adopting this arrangement was to get room for the feed connections, but incidentally it has the advantage of taking the downward thrust of the tool on solid metal instead of a bridge that must be made strong enough to carry the load.

The cross feed is of the usual type and its screw is fitted with a hand-wheel for bringing the tool up to the work. This hand-wheel is about 17 in. in diameter, and as the tool must be forced into the work with great power it is difficult or even impossible for a light man to do the work properly and efficiently. Therefore, a gear is placed on the shaft back of the hand-wheel, and a pinion which can be turned by a long-handled wrench made to mesh with it. Then, with a long handled wrench even a very light man can exert an enormous pressure on the tool and so force it into its work. Of course, no power feed is used here.

The only point in the longitudinal feed to which attention need be called is the ratchet and pawl. Instead of making

them just strong enough to do the work and then housing them in so as to protect the ratchet from injury, due to chips or other hard substances falling and lodging between the teeth, the whole arrangement is made strong enough to do its work without any danger of breakage, regardless of the size of the chip that may be lodged between the teeth.



Car Wheel After Roughing Cut.

On this carriage for longitudinal feed there is the turret. It consists of heavy steel casting planed smooth on the bottom and fitted on four sides for the reception of tools. One is the roughing tool of the usual form that is held by the ordinary clamping screws. The second is one that rounds off the rough-turned corners of the flanges, and the third is a former for the flange and tread that is held to the flat face of the turret prepared for it by two machine screws. The fourth is the forming tool for the taper of the tread and the round at the edge, and is held in the same way.

The turret is held as follows: The nut for the longitudinal feed screw has a pocket in which the square head of a bolt 3 in. in diameter sets, and which holds the latter up in place. This bolt passes up through the carriage and the turret and serves as the pivot about which the latter can turn. It is bored out at the top and threaded for a 2-in. bolt, which, acting through a washer, serves to clamp the turret securely to the carriage.

The adjustment for squareness is equally simple. The turret casting is approximately square, and at each corner the two edges are faced off so as to be in line with the corresponding ones on the other corners. On the front of the carriage there are two heavy lugs, upon which a pair of cam arms are pivoted. When these are up and the bolt slackened off, the turret can be freely turned about its pivot. When it has been set to an approximate position the cams are turned down and brought to a bearing against the finished corners of the turret casting, thus squaring it and effectually preventing it from being turned. Tightening on the central stud then effectually clamps it and it is ready for work. In order to facilitate the turning two studs are screwed into the top of the turret, the heads of which are made to fit a wrench, which also takes all other parts, such as the spindle of the pinion of the cross feed, etc.

The depth of cut that may be taken depends, of course, on the requirements of the case and may be varied accordingly. The longitudinal power feed, however, is ranged in eighths of an inch. Each teol of the feed ratchet represents a feed of ⅛-in., and the dog can be set to take as many as three at a time; hence the feed may be ⅛, ¼ or ⅜-in.

In a test that was made at the works of the company on May 15 car wheels were turned off in which there was a cut and feed of ⅜-in. each, taken at a speed of from 15 to 19 ft. per minute. The time taken from floor to floor of a pair of wheels, as well as the other details of the test, are given in the following table:

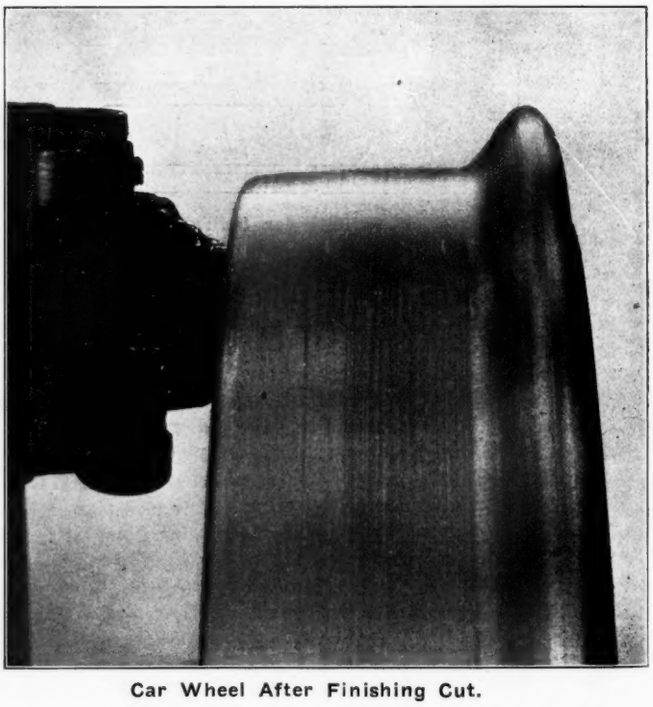
	No. 1.		No. 2.		No. 3.		Engine truck whls.	
Diam. wheel, finished..	34⅜ in.		34 $\frac{3}{16}$ in.		34$\frac{11}{16}$ in.		30⅝ in.	
Diam. wheel, rough....	35⅛ in.		34 $\frac{15}{16}$ in.		34¼ in.		.....	
	Min.	Sec.	Min.	Sec.	Min.	Sec.	Min.	Sec.
Floor to chuck.....	1	5	2	6	1	18	1	2
Turning	17	8	16	2	18	17	13	55
Machine to floor.....	1	2	1	17		50		4
Total time	19	47	18	45	19	85	15	15
Cutting speed, ft. pr min	15 & 16		16		14		19	

Time to change from turning tender to engine truck wheels 6 min. 1 sec.

The operation of the machine during these tests was in the hands of William Anthony, of the Reading shops of the Philadelphia & Reading Railroad by courtesy of H. D. Taylor, the Superintendent of Motive Power.

In these tests the final finish was remarkably fine. There was not a trace of chatter to be found, and the surfaces of the treads were free from those fine cracks extending down into the metal that are so characteristic of surfaces from which metal has been removed in heavy cuts at high speeds. The reproductions of photographs of these surfaces taken first after the roughing, and then after the finishing cut, show the effect very clearly.

The method of procedure is the usual one. The wheels are set in position and the roughing tool made to take a cut across the tread and top of the flange. The tread and flange tool is then forced in, taking a broad smooth cut, and leaving the surface in the excellent condition already noted. Then comes a similar tool for cutting the taper at the outer edge of the



Car Wheel After Finishing Cut.

tread and round the corner of the rim. This done, the wheels are finished. The lathe is built to the following specifications:

Effective range of wheel diameters.....26 in. to 42 in.
Maximum diameter that will swing clear.....44½
Diameter of face plate.....53½
Maximum distance between face plates.....8 ft. 8 in.
Gear changes 2
Speed of face plate.....0.74 to 3.3 revs. per min.
Driving motor.....Westinghouse 34-h. p. at 750 r. p. m.
Feeds .....3 from ⅛-in. to ⅜-in. per rev.
Feed strokes per revolution of face plate.....5

THE RELATION OF ENGINEERING EDUCATION TO INDUSTRIES.*

BY CHARLES BUXTON GOING.

Our schools of applied science have been—and are—so splendid in their achievements that criticism is ungrateful, and may seem captious; but if it must be offered, it would seem to be that they, in turn, are over-academic. The prevalent belief that the engineering graduate is "too full of theory"—that he must have a considerable supplementary training in minor "practical" positions before he can be trusted to work out results which will be economically valuable—would seem to indicate that his training has failed to include recognition of some important elements in the problems he is supposed to have been taught to solve. For the shortcoming suspected is not simply his comparative inexperience. There are no backstairs to the treasury of knowledge gathered through years of contact with all kinds of undertakings under all kinds of conditions, and nobody expects the technical schools to discover or to build any. The fear is not as to the height of elaboration of the structure of the education they afford, but as to the inclusive scope of its foundations and as to its perspective. The belief, in short, is that the school is out of close parallel with life.

I realize most clearly that any such criticism as I have just offered can apparently be immediately disposed of by citation from the catalogue of almost any large engineering school. The number and diversity of courses that may be found therein would seem to indicate a close observance of almost all the ramifications of engineering work, and the survey and construction of an educational pathway closely following each. What, then, is the meaning of the criticism which I have implied? It is qualitative rather than quantitative. To put it baldly, it is that the subjects all too often are not taught as they must be practiced.

For this condition, if it exist, I think there may be two main causes. The first is, the persistence of the natural tendency to cling to old forms and methods of education or to change them as little as possible in applying them to new subject matters. That is the way in which the world usually introduces its great changes, even changes which are destined ultimately to prove revolutionary. The first railway carriage was a sort of glorified stage-coach body hung on a new style of wheels. It took two-thirds of a century to evolve the Pullman coach, the air brake and the M. C. B. coupler. Steam at sea did not venture to discard spars and sailing-vessel lines nor to commit itself to hulls designed properly for screw propulsion, until after nearly a half-century of experiment. Up to the time of our Civil War and even later, the battleship differed from the merchantman chiefly in the number of decks and guns with which it was equipped; a little more than a quarter century has covered the specialization of the battleship as a wholly distinct genus. The university (which, as I have already suggested, clings to traditions even more closely than seafaring folk), has not yet had as long as this to adapt its form and structure to the new power by which it is actuated. I do not know what the technical school of 1950 may be, but I venture to think that it may differ, more organically and functionally, from the technical school of to-day, more than Columbia School of Mines and the Massachusetts Tech differ from Oxford and Cambridge of 1850.

Now, most unfortunately, so far at least as concerns university teaching of a subject like engineering, the good old academic temper has always been fearful, if not intolerant, of anything utilitarian—or, to use frankly the more objectionable word, of anything commercial. It is traditional that a German professor has been known to thank God that no one could by any possibility ever make any use of his subject. I, personally, heard the German-trained incumbent of a teaching chair deplore the wretched necessity of having any students at all at the university; it interferred so with the professor's opportunities for research and meditation. If my observation and interpretation of phenomena are correct, some lingering vestiges of this old mood (a fine one in its own proper place, but now persisting out of place) have made our technical schools reluctant to recognize and to teach economic limitations as clearly as scientific standards of perfection. It has been said that anything is feasible in engineering if it is within the laws of nature; the question whether it is advisable is determined by the law of dividends. The engineer, whose function it is to carry works of construction or production to practical success, ought to be competent to plot accurately the curve along which the forces behind these two systems of law are in equilibrium; the complaint is that his schools give him too academic a devotion to the one and an inadequate idea of the imperative character of the other. Theoretical standards of construction and theoretical figures of performance are idealized in his philosophy, and the ideals are not sufficiently balanced by a knowledge and appreciation of costs, and of the fact that there is always a point, varying with every case, beyond which further refinement toward the ideal spends more than it saves and so becomes a vanity of perfection—a professional mistake.

Now, criticism which is not constructive fulfils only half a function. Let me attempt the dangerous service of suggestion. A traditional institution of the universities is the professor's Sabbatical year, in which he is supposed to travel and to familiarize himself with the work done in his subject elsewhere. Suppose that, recognizing the relatively high rate of progress in the applied sciences, these Sabbatical periods in the technical faculties were reduced to five years, or, better still, to three; and that the teacher were required to spend each third or fifth year *not* in sojourning at other universities, working in other laboratories, hearing other lectures, and seeing how his subject is *taught*—but in active work as an officer or *attache* in a railway organization, a bridge or construction company, or a manufacturing plant, seeing how the things he teaches are actually practiced. Salary would be immaterial, as his full income from the university would be continued; opportunity for the widest and closest possible contact with work in the field under "all the conditions there are" would be everything. I owe the completion of this concept to the active executive manager of one of our largest manufacturing corporations. His enthusiastic approval of it goes far to indicate the cordial co-operation that would be given by business interests in making such a plan operative. To them it would bring not only the valuable aid of the university man's trained faculties, but the prestige of association with colleges of high standing and repute. To them, also, would soon accrue another advantage in the higher usefulness of the graduates turned out from the college to enter industrial or engineering service. To the professor would be opened the most fertile and most instructive working and research laboratories, where experiments on a full-sized scale, backed by an endowment such as he never could dream of controlling, were spread before him in full operation twenty-four hours of the day. And think of the assured grasp of the latest ideas and methods, the freshness of viewpoint, and the energy of demonstration with which each man would return to his classes after a year in the field. This would be a sort of university extension that would keep engineering education and engineering practice in intimate communion and in constant parallel.

The boy entering Annapolis or West Point steps at once into the life of the navy or the army and becomes a part of it. His graduation is merely a step forward in the same direction. The boy entering one of our engineering schools usually steps into something totally *unlike* an engineering corps, a manufacturing shop, or the motive-power department of a railway. His graduation is a plunge into a strange and

*From a paper read before the Society for the Promotion of Engineering Education, Pratt Institute meeting, June 25.

bewildering stream moving in a new direction, in which he must find a new foothold and new orientation.

The change, therefore, that I think will bring us nearer to truth is not one of detail; it is fundamental. It cannot be accomplished easily. Nevertheless, somewhere in that direction, I think, lies the way to the great technical school of the future. We shall begin to work toward it when our engineering teachers live nearer to our practising engineers.

FREIGHT CARS IN 1890 AND IN 1908.

Following the comparisons printed in our issue of June 4, we publish herewith a partial comparison of the freight cars of the principal roads in service in 1890 and in 1908. This comparison is necessarily incomplete; there have been many corporate changes since 1890, and the records of 18 years ago are not always readily accessible. The statement is in other respects imperfect; the average freight car capacity of 1908 was probably just about double the capacity of 1890, but it was not feasible to work out a comparison of car capacities per mile of road. Nevertheless, in spite of these obvious imperfections, the table is interesting, and we present it for what it is worth.

We are indebted to W. B. Schofield, assistant to the president, Delaware & Hudson Company, for the compilation of this material.

Comparative Summary of Freight Cars in Service on Railways of the United States, 1890 and 1908.

	Miles.		Freight equipment.		Increase.	Per cent. of ch'nge.	Freight cars per mile of road		Average length of haul.		Freight cars Per 1,000 freight-car miles.		Per 1,000 rev'nue-ton miles.		Rate, per ton-mile, dollars.		Fr't cars per $1,000 freight earn'gs	
New England Roads.	1890.	1908.	1890.	1908.			1890.	1908.	1890.	1908.	1890.	1908.	1890.	1908.	1890.	1908.	1890.	1908
Boston & Maine	.....	2,288	.....	23,964	.....	.....	....	10.5	.....	106.91	....	.119	.....	.0111	.....	.01045	....	1.07
Central Vermont	.....	536	.....	2,866	.....	.....	....	5.3	.....	77.56	....	.112	.....	.0119	.....	.00960	....	1.23
Maine Central	733	931	2,566	7,223	4,657	181.4	3.5	7.8	69.15	81.61	....	.163	.0230	.0150	.01955	.01062	1.19	1.42
N. Y., N. H. & Hartford	.....	2,047	.....	29,821	.....	.....	....	14.6	.....	94.83	....	.156	.....	.0167	.....	.01414	....	1.18
Total	.....	5,802	.....	63,874	.....	.....	....	9.6	.....	90.23	....	.138	.....	.0137	.....	.01120	....	1.23
Trunk Line Roads.																		
Baltimore & Ohio	1,886	3,992	25,553	82,592	57,039	223.2	13.5	20.7	192.98	197.77	.083	.114	.0095	.0084	.00633	.00569	1.50	1.48
Buf., Roch. & Pittsburgh	304	568	5,410	15,349	9,939	183.7	17.8	27.0	121.11	145.10	.234	.217	.0254	.0118	.00650	.00493	3.37	2.40
Central R. R. of N. J.	.....	610	.....	21,247	.....	.....	....	34.8	.....	78.84	....	.165	.....	.0102	.....	.00845	....	1.22
Chesapeake & Ohio	931	1,840	9,486	34,252	24,766	261.1	10.0	18.6	267.00	274.00	.084	.135	.0094	.0076	.00536	.00432	0.57	1.75
Delaware & Hudson	747	845	11,421	21,235	9,814	85.9	15.3	25.1	63.08	121.23	.123	.156	.0138	.0099	.00991	.00710	1.40	1.39
D., L. & Western	781	958	32,368	27,211	*5,157	15.9	41.4	28.2	147.35	179.50	.108	....	.0201	.0088	.00948	.00785	2.12	1.11
Erie	.....	2,171	.....	54,909	.....	.....	....	25.3	.....	168.35	....	.144	.....	.0097	.....	.00600	....	1.62
Lehigh Valley	1,160	1,446	46,088	42,405	*3,683	8.0	40.0	29.3	127.00	181.08	....	.139	.0270	.0088	.00780	.00630	3.46	1.40
N. Y. Cent. & H. R.	1,421	3,781	34,543	61,882	27,339	79.1	24.3	16.3	187.00	197.00	....	.084	.0152	.0069	.00750	.00643	2.01	1.21
Pennsylvania	3,760	3,980	62,535	130,163	67,628	108.1	16.6	32.7	89.20	167.76	.078	.127	.0077	.0077	.00675	.00569	1.14	1.33
Reading	670	1,007	25,660	44,676	19,016	74.1	38.3	44.4	71.96	93.76	....	.160	.0164	.0101	.01053	.00726	1.55	1.39
Western Maryland	.....	543	.....	5,949	.....	.....	....	10.9	.....	109.86	....	.136	.....	.0085	.....	.00655	....	1.30
Total	.....	21,741	.....	541,870	.....	.....	....	26.1	.....	159.52	....	.131	.....	.0090	.....	.00638	....	1.47
Southern Classification.																		
Atlantic Coast Line	.....	4,407	.....	24,408	.....	.....	....	5.5	....	142.52	....	.144	.....	.0170	.....	.01235	....	1.38
Central of Georgia	.....	1,913	.....	10,440	.....	.....	....	5.4	.....	149.64	....	.152	.....	.0123	.....	.01082	....	1.37
Louisville & Nashville	.....	4,365	.....	40,589	.....	.....	....	9.3	.....	172.87	....	.132	.....	.0101	.....	.00779	....	1.30
Mobile & Ohio	.....	926	.....	11,247	.....	.....	....	12.1	.....	229.66	....	....	.....	.0099	.....	.00631	....	1.58
Nash., Chat. & St. Louis	.....	1,230	.....	9,440	.....	.....	....	7.7	.....	161.00	....	.300	.....	.0111	.....	.00890	....	1.24
Norfolk & Western	1,555	1,881	18,656	37,276	18,620	99.9	12.0	19.8	253.41	267.94	.092	.125	.0068	.0075	.00430	.00481	0.63	1.55
Seaboard Air Line	.....	2,611	.....	13,902	.....	.....	....	5.3	.....	149.96	....	.135	.....	.0148	.....	.01124	....	1.32
Southern	.....	7,489	.....	54,086	.....	.....	....	7.2	.....	154.05	....	.161	.....	.0155	.....	.00979	....	1.58
Total	.....	24,822	.....	201,388	.....	.....	....	9.0	.....	178.45	....	.164	.....	.0123	.....	.00900	....	1.41
Central Classification.																		
Chic., Ind. & Louisville	.....	616	.....	5,563	.....	.....	....	9.0	.....	146.00	....	.155	.....	.0135	.....	.00822	....	1.64
Cin., Ham. & Dayton	347	1,038	5,085	12,704	7,619	149.8	14.7	12.2	66.70	114.19	.186	.197	.0206	.0136	.00860	.00624	0.42	2.27
C., C., C. & St. Louis	1,784	1,982	17,830	22,670	4.840	27.1	10.0	11.4	165.00	146.20	....	.100	.0164	.0079	.00698	.00568	2.23	1.44
Grand Rapids & Indiana	.....	592	.....	3,233	.....	.....	....	5.5	.....	95.99	....	.107	.....	.0092	.....	.00730	....	1.25
Lake Erie & Western	.....	886	.....	4,663	.....	.....	....	5.0	.....	120.40	....	.116	.....	.0092	.....	.00738	....	1.33
Lake Sh. & Mich. South.	1,445	1,511	19,848	34,549	14,701	74.1	13.2	22.9	187.00	173.50	....	.091	.0092	.0068	.00626	.00525	1.41	1.33
Michigan Central	1,609	1,746	12,723	18,579	5,856	46.0	7.9	10.6	192.00	171.00	....	.076	.0095	.0068	.00695	.00627	1.37	1.09
N. Y., Chic. & St. Louis	523	523	6,863	11,877	5,014	73.1	13.1	22.7	323.00	229.00	.058	.086	.0065	.0071	.00508	.00526	1.28	1.50
Pennsylvania	1,010	1,416	32,979	53,044	20,065	60.8	32.6	37.4	82.32	79.93	.055	.172	.0165	.0113	.00700	.00610	2.45	1.81
P., C., C. & St. Louis	1,526	1,472	11,092	22,905	11,813	105.6	7.3	15.6	109.09	118.07	.166	.084	.0058	.0071	.00680	.00640	0.88	1.07
Pere Marquette	.....	2,298	.....	18,858	.....	.....	....	8.2	.....	169.01	....	.148	.....	.0117	.....	.00602	....	2.09
Vandalia	.....	829	.....	7,832	.....	.....	....	9.4	.....	99.78	....	.132	.....	.0100	.....	.00690	....	1.41
Total	.....	14,909	.....	216,477	.....	.....	....	14.2	.....	146.92	....	.122	.....	.0095	.....	.00642	....	1.52
Western Classification.																		
Atch., Top. & Santa Fe	7,111	9,431	23,013	51,834	28,821	125.2	3.2	5.5	228.61	392.24	.087	.089	.0130	.0065	.01228	.00949	1.05	0.84
Chicago & Alton	849	998	7,648	10,395	2,747	35.9	9.0	10.4	152.86	151.85	.109	.112	.0147	.0076	.00883	.00610	1.67	1.36
Chicago & East. Illinois	.....	957	.....	19,983	.....	.....	....	20.9	.....	156.19	....	.192	.....	.0105	.....	.00470	....	2.34
Chic. & North Western	4,250	7,632	21,097	57,620	36,523	173.1	4.8	7.6	150.40	158.07	.075	.177	.0105	.0119	.00980	.00870	1.07	1.37
Chic., Burl. & Quincy	.....	9,282	.....	53,156	.....	.....	....	5.7	.....	240.82	....	.099	.....	.0068	.....	.00800	....	1.00
Chicago Gt. Western	845	818	3,849	7,939	4,090	104.9	4.5	9.7	285.71	267.71	.076	.105	.0091	.0094	.00720	.00645	1.26	1.46
Chic., Mil. & St. Paul	5,657	7,301	22,716	44,086	21,370	94.1	4.0	6.0	198.30	190.17	.088	.095	.0123	.0077	.00995	.00811	1.24	1.09
Chic., R. I. & Pacific	3,340	7,970	14,256	39,581	25,325	177.6	4.3	4.9	182.30	221.40	.094	.105	.0115	.0087	.01020	.00940	1.21	1.04
Chic., St. P., M. & O.	.....	1,730	.....	12,430	.....	.....	....	7.2	.....	140.17	....	....	.....	.0134	.....	.00893	....	1.50
Colorado & Southern	.....	1,952	.....	9,166	.....	.....	....	4.7	.....	132.00	....	.130	.....	.0093	.....	.01034	....	0.92
Denver & Rio Grande	1,928	2,499	7,693	11,673	3,980	51.7	4.0	4.7	149.00	117.02	.005	.137	.0043	.0108	.02060	.01330	1.13	0.81
Dul., S. S. & Atlantic	569	595	2,759	2,813	54	1.9	4.8	4.7	49.06	61.40	.134	....	.0214	.0155	.01220	.00987	1.70	1.57
Great Northern	3,304	6,637	9,999	42,131	32,132	321.3	3.0	6.3	187.36	268.00	.134	.128	.$150	.0070	.01250	.00780	1.20	1.05
Illinois Central	2,875	4,594	13,825	60,871	47,046	340.2	4.8	13.2	187.00	241.09	.079	.130	.0116	.0084	.00953	.00586	1.22	1.72
Iowa Central	.....	558	.....	2,924	.....	.....	....	5.2	.....	175.65	....	110	.....	.0069	.....	.00592	....	1.23
Kansas City Southern	.....	828	.....	7,148	.....	.....	....	8.6	.....	278.64	....	.111	.....	.0069	.....	.00723	....	1.07
Minn. & St. Louis	.....	1,027	.....	3,942	.....	.....	....	3.8	.....	105.25	....	.192	.....	.0145	.....	.01063	....	1.54
Minn., St. P. & S. Ste. M	.....	2,308	.....	12,762	.....	.....	....	5.5	.....	213.65	....	.154	.....	.0118	.....	.00814	....	1.63
Missouri Pacific	.....	6,479	.....	41,295	.....	.....	....	6.4	.....	218.59	....	.128	.....	.0090	.....	.00685	....	1.31
Mo., Kan. & Texas	.....	3,072	.....	22,417	.....	.....	....	7.3	.....	236.57	....	.136	.....	.0147	.....	.01010	....	1.45
Northern Pacific	3,585	5,649	15,130	42,171	27,041	179.0	4.2	7.4	307.00	325.60	.088	.125	.0138	.0082	.01400	.00900	0.98	0.90
St. Louis & San Fran	1,329	5,064	5,014	29,984	24,970	498.0	3.8	5.9	213.96	154.80	.089	.140	.0134	.0106	.01239	.00970	1.08	1.25
St. Louis & Southwestn	.....	1,464	.....	9,452	.....	.....	....	6.5	.....	240.82	....	.149	.....	.0133	.....	.01010	....	1.32
San An. & Aransas Pass	.....	724	.....	1,611	.....	.....	....	2.2	.....	160.80	....	.093	.....	.0098	.....	.01472	....	0.75
Southern Pacific	6,053	9,834	21,312	42,677	21,365	100.2	3.5	4.3	229.70	270.53	.090	.077	.0160	.0054	.01837	.01907	0.76	0.60
Texas & Pacific	.....	1,885	.....	11,212	.....	.....	....	5.9	.....	185.06	....	.114	.....	.0122	.....	.01030	....	1.19
Union Pacific	5,411	5,781	20,475	25,040	4,565	22.3	3.8	4.3	278.89	402.77	.080	.067	.0100	.0040	.01261	.00826	0.83	0.47
Wabash	1,921	2,514	13,434	22,979	9,545	71.0	7.0	9.1	209.30	225.23	.078	.092	.0094	.0072	.00647	.00573	0.69	1.34
Wisconsin Central	.....	1,023	.....	7,632	.....	.....	....	7.5	.....	179.32	....	.158	.....	.0096	.....	.00672	....	1.43
Total	.....	110,606	.....	706,924	.....	.....	....	6.4	.....	210.74	....	.124	.....	.0096	.....	.00867	....	1.23
Total all roads	.....	177,880	.....	1,730,533	.....	.....	....	9.7	.....	178.11	....	.130	.....	.0100	.....	.00803	....	1.34

*Decrease.

Note.—Narrow gage and non-revenue cars excluded; company freight included.

General News Section.

On August 1 the Rock Island-Frisco system will establish through freight and passenger service into Baton Rouge and New Orleans over the Red River Valley Railroad.

The Kansas Railroad Commission has put men to work on the books of the railways in that state to ascertain what their earnings have been under the 2-cent fare order, which went into effect in September, 1907.

According to a statement credited to Railroad Commissioner Ketchum, of Iowa, recent severe rains in that state have damaged the fields and crops more seriously, by many thousands of dollars, than would have been the case in former years, before the railway companies filled in numerous trestles with earth embankments. In building the embankments the openings left for the waterways have been made too small, it is charged.

Thirty-six train despatchers and chief despatchers, employed in 16 offices of the National Lines of Mexico, went on a strike on July 17 because the management refused to grant their demands for advances in wages. The chief despatchers asked to be raised to $75 a month and the others for an increase of $10 a month. Train service was not seriously interfered with. The general manager announces that he has filled the post of every despatcher with a competent man and that the strike is already broken.

Newspaper despatches say that the Union Pacific, claiming that under the government grants of 1868 it owns 200 ft. on each side of its track, has taken forcible possession of a tract of land at Brighton, Colo., covered with stores and valued at $20,000. It is stated that the road's contention applies to land along the Union Pacific through several states and that two months ago attorneys for the company notified those who they claim infringed on their right-of-way that they would have to get off or take leases from the railway.

The first National Conservation Congress of the United States will be held in the auditorium of the Alaska-Yukon-Pacific Exposition at Seattle, Wash., on August 26, 27 and 28. Addresses are announced on such subjects as irrigation, forestry, soils, mines, good roads and other means for transportation, and the relation of capital to labor in conserving natural resources. The congress will be under the direction of the Washington Conservation Association, an organization composed of several hundred prominent men of the state of Washington.

Julius Kruttschnitt, director of maintenance and operation of the Harriman Lines, in an interview denies that it is intended to electrify the Sacramento division of the Southern Pacific. The Harriman Lines have been investigating the question of electrification for some years, thinking that electricity might possibly be used more advantageously than steam on the mountainous Sacramento division, but the large new Mallet compound oil-burning locomotives have been used on this division so successfully that its electrification cannot be considered a probability.

The Burlington's passenger train No. 1, which leaves Chicago at 4:30 p.m. and reaches Denver, 1,018 miles, at 9 p.m. of the next day, has been named the "Denver Limited," and the advertising department of the road calls attention to the record of the train during the year 1908, when it was late only 10 days, and up to June 30 it had been late only five times in 1909. From February 18, 1908, to September 25, 1908, it was late only three times, and on these three days there was a flood at Lincoln, Neb., which washed away about $1,000,000 worth of the company's property.

Four Years' Record of the Pennsylvania Special.

The Pennsylvania Railroad's 18-hour train between New York and Chicago has just completed a continuous record of four years' service. From June 12, 1905, when the train was started, to June 12, 1909, a total of 2,922 trips were made—1,461 in each direction—and on 2,483, or 85 per cent. of these trips, the train was on time, or within five minutes of its schedule, at destination. On only 160 trips, or an average of 80 in each direction, for the entire four years—or 20 for each year—was the train more than 30 minutes late. From New York to Chicago the train was on time to the minute 1,159 times out of 1,461 trips, while from Chicago to New York the train arrived exactly on schedule 1,202 days.

The best of the four years was the last, June 12, 1908, to June 12, 1909, when the train was on time or within five minutes of its schedule at New York on 326 days out of 365, and at Chicago on 315 days. The train thus made its schedule during the past year approximately 88 per cent. of the time. For the month ending July 1, 1909, the train was on time at both Chicago and New York on every one of the 30 days.

New York to Jersey City in Three Minutes.

The Hudson & Manhattan tunnels between the "Hudson Terminal" at Cortlandt, Church and Fulton streets, New York, and the Pennsylvania Railroad station in Jersey City, were opened for business last Monday afternoon, according to the announcement published last week. There was a great celebration in Jersey City. Many hundreds of invited guests were carried between the two cities in the forenoon, and at 3 p. m. the trains began taking regular passengers. In the morning and evening hours trains of six or seven cars are running at three-minute intervals, and on Monday evening and Tuesday morning they were most of the time packed full; and there was a noticeable thinning of the crowds on the Cortlandt street ferryboats. The running time of trains is a little under three minutes. The terminal station in Manhattan occupies two floors, below the street level, nearly the whole length of the company's twin buildings, extending from Cortlandt street to Fulton street. The upper of the two levels is reached from the street by winding inclined planes descending on a grade of about 4 per cent. This floor is a spacious concourse with many ticket booths. In these the ticket sellers are women. The level below is reached by stairways leading down to the platforms from which passangers board the trains. Passengers disembarking from the trains leave from doors on the other side of the cars, and thus use separate platforms and ascend by separate stairways. The upper or concourse floor is surrounded by stores, barber shops, cigar stands and other conveniences. The Pennsylvania, the Lehigh Valley and the Erie have ticket offices at one side of the concourse, though the Erie as yet takes no passengers through the subway, except for its New York, Susquehanna & Western division, the trains of which use the Pennsylvania station. Separate subway trains are run for passengers bound for points on the Pennsylvania Railroad, and at Jersey City there are two sets of elevators, one leading up to the Pennsylvania station and the other leading up to a street exit a little farther west.

American Exposition in Berlin in 1910.

An exposition of American products is to be held in Berlin, Germany, during the months of April, May and June next year, and the circular issued by the American Advisory Committee indicates that careful and businesslike preparations have been made for it. The exhibition is to be held in the magnificent Exposition Palace, which is near the Zoological Garden, a very favorable location. Exhibits "will be limited to articles of proved merit." There is a large American committee among whom are: Colonel John Jacob Astor, New York; Emil L. Boas, resident director, Hamburg-American Line, New York; James M. Dodge, chairman, Link Belt Co., Philadelphia; E. H. Gary, chairman, United States Steel Corporation, New York; John Kirby, Jr., president, Dayton Manufacturing Company, Dayton, Ohio; Lee, Higginson & Co., bankers, Boston, and Herman Ridder, publisher of the *Staats-Zeitung*, New York. The chairman of the German Advisory Committee is Baron R. von Brandenstein. The manager of

the American headquarters is Max Vieweger, 50 Church street, New York City. The price of space for exhibits will be $4 a square foot, which includes the cost of all decorations of the exhibition booths; suitable foundations for the exhibits; carpeting; water, heat and light; janitor service; insurance against loss by fire or theft, to the extent of $25 per square foot; protection by employees of the best Berlin protective organization; a short notice in the official catalogue concerning the exhibitor and his exhibit; space in the advertising section of the official catalogue; free passes for the exhibitors or their representatives, and storage facilities for packing material in the basement of the exposition building. Special arrangements may be made to have electric current furnished at a low price for extra light or for operating machinery. Applications for extra current must be filed before February 1. Exhibits will be entitled to a reduction of 20 per cent. from the regular freight charges both ways if shipped by the Hamburg-American Line or the North German Lloyd. Among the regulations are the following: Exhibitors may distribute approved advertising matter from the space occupied by them, but in no other way. The first allotment of space will take place early in November, 1909. Gasolene, benzine, alcohol or other dangerous material will not be admitted into the building. In the event of disputes the courts in Berlin will have jurisdiction.

A Change of Name Needed.

The Idaho Northern Railroad Company runs from Enaville to Paragon, Shoshone County, Idaho, 33 miles. The Idaho Northern Railway Company operates between Murphy and Emmett, Idaho, 59 miles. At Nampa, 31 miles from Murphy, it connects with the Oregon Short Line. The first named company is in northern Idaho, having its general offices at Wallace, Idaho, on the Oregon Railroad & Navigation Company's line, while the second company is in southern Idaho, having its general offices at Nampa. Both roads are in the state of Idaho, but they are nearly 500 miles apart. Recently a ticket agent in Texas, ticketing two old people destined for Emmett, which is in southern Idaho, on the line of the I. N. Railway, routed them by way of Denver, Billings, Wallace and Enaville; and as a result they were landed in Wallace without money and at least 500 miles from the point to which they had paid their fare.

Employment Bureau on the Northern Pacific.

Howard Elliott, president of the Northern Pacific, has issued a circular announcing the establishment of an employment bureau "to assist employing officers in obtaining satisfactory persons for service with the company; to keep an adequate record of the character and length of service of those now in the employ of or hereafter employed by the company; to co-operate with all officers and employees for the purpose of improving the general character and efficiency of the service." Oakley D. Johnson has been appointed superintendent of the employment bureau, with headquarters at St. Paul, Minn.

Grand Trunk Station and Hotel at Ottawa.

The plans for the construction of the new station and hotel at Ottawa, being built by the Ottawa Terminal Railways Co. (a subsidiary of the Grand Trunk Railway) have been made public. The main entrance to the hotel is reached through a large portico entering on a large hall, and the office is so situated as to command a full view of all the avenues of approach. Off the rotunda are lounging rooms, palm garden, ladies' tea room and reception room, the main dining room and ladies' dining room. On the first floor there will be reception rooms, a large foyer, a banquet hall and a ball room, all arranged so as not to encroach on the privileges of the hotel guests. Also on the first floor there will be 35 chambers, of which a number will form state apartments. The second, third, fourth and fifth floors have each 58 chambers, two of which on each floor may be adapted for parlors, and on the attic floor are situated 37 chambers for guests, two dormitories for men and five dormitories for women. Of the total number of sleeping apartments for guests, 210 will be provided with private baths and an additional 62 with stationary washstands with hot and cold water connections. All the rooms will have built-in wardrobes, and there will be general toilets on each floor. Close to the rotunda are a musicians' gallery, a writing room, private dining rooms and a smoking room.

The station, adjacent to the hotel, will be on the south side of Rideau street, between the Cory building and the Rideau canal, occupying the present site of the Grand Trunk building. The baggage and express building now under construction on Besserer street will be retained. The station building is to be 140 ft. wide and 228 ft. deep. The plans provide for a concourse 60 ft. wide and the general waiting room will be in the main building on a level with the tracks. It will extend to the height of four stories. A lighted and ventilated subway 20 ft. wide running north and south will lead to the hotel (Chateau Laurier), and the baggage and express building will be reached by a covered way from the east end of the concourse. The architects are Ross & MacFarlane and the contractors P. Lyall & Son, Montreal.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.
American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.
American Assoc. of Local Freight Agents' Ass'ns.—G. W. Dennison, Penna. Co., Toledo, Ohio
American Institute of Electrical Engineers.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
American Railway Association.—W. F. Allen, 24 Park Place, New York.
American Railway Bridge and Building Association.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
American Railway Engineering and Maint. of Way Assoc.—E. H. Fritch, Monadnock Bldg., Chicago.
American Railway Industrial Association.—R. E. Wilson, Ry. Exchange, Chicago
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony Bldg., Chicago.
American Society for Testing Materials.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., N.Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
American Street and Interurban Railway Association.—B. V. Swenson, 29 W. 39th St., New York; Oct. 18-22; Denver, Colo.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago.
Association of Railway Claim Agents.—E. H. Hemus, A., T. & S. F., Topeka, Kan.
Association of Railway Telegraph Superintendents.—P. W. Drew, Wisconsin Central Ry., Chicago.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 24 Park Place, New York.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod. Montreal, Que.; irregular, usually weekly; Montreal.
Central Railway Club.—H. D. Vought, 95 Libery St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
Freight Claim Association.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.
International Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—F. C. Cook, Royal Insurance Bldg., Chicago
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month; except July and August; Des Moines.
Master Car Builders' Association.—J. W. Taylor, Old Colony Bldg., Chicago.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
North-West Railway Club.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
Railway Club of Pittsburgh.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month; except June, July and August; Pittsburgh.
Railway Signal Association.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.
Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
Society of Railway Financial Officers.—C. Norquist, Chicago; Sept. 7-8; Fort William Henry, Lake George, N. Y.
Southern Association of Car Service Officers.—J. H. O'Donnell, Bogalusa, La.
Southern and Southwestern Ry. Club.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
Western Canada Railway Club.—W. H. Rosevear, 199 Chestnut St.; Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
Western Society of Engineers.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Central Passenger Association lines will make a rate of a fare and a half for the round trip for the meeting of the American Bankers' Association in Chicago in September.

It is expected that the Interstate Commerce Commission will give hearings in Portland, Seattle and Tacoma in October on the complaints made by the commercial interests of these cities against the plan of readjusting rates to Spokane which has been proposed by the transcontinental roads.

An arbitration commission appointed by a court at Little Rock, Ark., to pass on a dispute between the Cunningham Commission Company and the St. Louis, Iron Mountain & Southern Railway, has decided that the railway should pay to the Cunningham company $15,000 for delays to shipments, failure to deliver cars and for excessive demurrage charges.

At a recent meeting of the Western Passenger Association it was decided to abolish second-class party rates. The Chicago Great Western, however, has announced that it will again establish such rates from Chicago to Kansas City, Leavenworth and St. Joseph on August 15; and the Santa Fe, the North Western, the Minneapolis & St. Louis, the Burlington, the Rock Island and the Illinois Central have announced that they will meet its competition.

A number of western lines have decided to open to the general public the reduced rates that are to be offered during the rest of the summer for merchants' excursions to Chicago, St. Louis, Kansas City, Omaha and St. Joseph. This reduced rate is a fare and a half for the round trip from points west of the Missouri river. Heretofore, to take advantage of the rates it has been necessary for a passenger to hold a certificate from the commercial organization under whose auspices the merchants' conventions were held.

The lines of the Central Freight Association have decided to accord the Chicago to New Orleans rates to the New Orleans & Northeastern and its connections on business destined for Cuba from their territory east of the Chicago-Indiana line and as far east as the Buffalo-Pittsburgh line. The same arrangement has been prepared and is under consideration for business to Colon, Mexico, and Central and South American points. Business from Central Freight Association territory has heretofore been drawn through the Atlantic ports on account of the lower rates that way.

A press despatch from Washington says that the Boston & Maine has given notice of a new tariff on import freight from Boston to Missouri river points, which, however, makes no change in the rates on commodities below the regular classes. The new tariff goes into effect August 16, and puts Boston on a level with Baltimore. The last reductions made by the lines out of New York on import freight to Missouri river points went into effect July 12, and the reduction made by the Baltimore & Ohio from Baltimore goes into effect August 2. All the announcements here given appear to deal only with traffic to Missouri river points.

The Kansas City Southern has followed the example of the Rock Island and the Frisco, and filed with the Arkansas Railroad Commission an agreement to suspend litigation in the Arkansas rate cases for a year. Under the agreement a trial of one year will be given to the so-called "court tariff" of freight rates, which was prescribed by Judge Trieber, of the federal court. Meantime a test of the 2½-cent passenger rate will also be made. If either the state or any railway is dissatisfied with results at the end of a year it may revive the litigation. The St. Louis, Iron Mountain & Southern and the St. Louis Southwestern have refused to make any such agreements.

The Central Passenger Association lines have authorized the following reduced round-trip rates for the conventions indicated, on the certificate plan: United National Association of Post Office Clerks, Atlantic City, September 6-10, 1909; fare, one and three-fifths. Masons Supreme Council Thirty-third Degree Ancient Accepted Scottish Rite, Boston, September 20-23, 1909; fare, one and three-fifths. Swiss Singing Bund, Louisville, August 29-30, 1909; fare, one and one-half. Montrose Bible Conference Association, Montrose, Pa., August 20-29, 1909; fare, one and three-fifths. National Association of Box Manufacturers, New York City, August 11-13, 1909; fare, one and three-fifths. Dressmakers' Protective Association of America, New York City, September 7-18, 1909; fare, one and three-fifths. American National Retail Jewelers' Association, Omaha, August 2-6, 1909; fare, one and one-half. Universal Craftsmen Council of Engineers, Washington, D. C., August 3-7, 1909; fare, one and three-fifths.

Commissioner Clark of the Interstate Commerce Commission, took testimony at St. Louis on July 12 and 13 regarding the relations of various railways to coal companies. According to the St. Louis newspapers several coal operators testified that they had been threatened by the Illinois Central with withdrawal of transportation facilities from their coal mines if they would not furnish the road for $1.20 a ton coal in excess of what they had contracted to sell to it at this price. The witnesses who testified to this effect were Burt Avery, secretary-treasurer of the Avery Coal Co.; O. Johnson, Johnson Coal Co.; D. Zilsdorf and M. Huecke, Dekalb Coal Co., and W. E. Borders Coal Co. Oliver P. Garrison, president of the Big Muddy Coal & Iron Co. and a director of the Missouri Pacific, testified that the Union Fuel Co., a Gould concern, jobs coal for the Big Muddy Coal Co., which furnishes about one-fifth of its output to Gould lines. E. H. Conrades, president and general manager of the St. Louis, Troy & Eastern, testified that the directorate of the Donk Brothers Coal & Coke Co. is the same as that of this railway, and that both are owned by the Merchants' & Manufacturers' Investment Co., a holding corporation. W. K. Kavanaugh, president of the Southern Coal & Mining Co., stated that the Southern Railway in 1906 cut the rate on coal from southern Illinois coal fields to St. Louis from 42 cents to 25 cents a ton in order to help the independent coal operators. The rate was subsequently raised to 32 cents. The evidence indicated that prior to 1906 coal companies that were more or less closely connected with railways were able to mine and market coal at lower prices than independent concerns. Mr. Kavanaugh said that the officers of the Southern Railway were no longer interested in the Southern Coal & Mining Co.

Condition of the Grain Crop.

The crop reporting board of the United States Department of Agriculture estimates as follows: The preliminary estimate of the area of corn planted is 109,006,000 acres, an increase of 7,218,000 acres (7.1 per cent.) as compared with the final estimate of last year's acreage. The average condition of the corn crop on July 1 was 89.3 as compared with 82.8 on July 1, 1908; 80.2 on July 1, 1907, and 84.8, the ten-year average on July 1.

Comparisons for important corn states follow:

STATES.	Acreage, 1909 — Per cent. of 1908.	Acreage, 1909 — Acres. thousands.	Condition, July 1 — 1909.	1908.	10-year average.
Illinois	108	10,206	94	80	87
Iowa	103	9,340	86	83	86
Texas	105	8,247	82	83	76
Nebraska	104	7,926	91	84	86
Missouri	108	8,145	91	74	85
Kansas	110	7,810	91	78	85
Oklahoma	120	5,915	94	74	88
Indiana	108	4,913	93	83	85
Georgia	104	4,472	90	88	86
Ohio	108	3,834	90	87	83
Kentucky	106	3,568	89	83	87
Tennessee	102	3,417	80	87	86
Alabama	106	3,233	77	86	85
North Carolina	104	2,898	83	92	88
Arkansas	108	2,889	91	81	83
Mississippi	108	2,862	72	86	82
South Carolina	107	2,218	87	89	84
South Dakota	106	2,059	93	84	85
Virginia	106	2,040	90	95	90
Michigan	104	1,976	86	86	81
Louisiana	130	2,226	91	87	80
Minnesota	104	1,680	91	70	80
Wisconsin	104	1,533	89	87	83
Pennsylvania	104	1,508	92	89	86
United States	107.1	109,006	89.3	82.8	84.8

The average condition of winter wheat on July 1, or when harvested, was 82.4, as compared with 80.7 last month, 80.6

at harvest, 1908; 78.3 in 1907, and 79.6, the average at time of harvest for the past ten years.

Comparisons for important winter wheat states follow:

STATES.	Per cent. of U. S. acreage in state.	Condition			
		At harvest, 1909.	June 1, 1909.	At harvest, 1908.	10-Year Avg. at harvest.
Kansas	21.1	76	72	71	75
Indiana	8.0	84	82	88	73
Nebraska	7.8	85	78	81	85
Missouri	7.0	85	82	74	82
Illinois	6.9	87	81	80	77
Pennsylvania	5.4	91	91	92	86
Ohio	5.2	78	76	83	75
Oklahoma	4.2	77	73	78	79
California	3.1	77	75	70	79
Tennessee	2.8	85	88	85	78
Virginia	2.8	89	93	88	81
Maryland	2.7	85	93	88	86
Michigan	2.7	88	86	92	71
Texas	2.4	56	56	79	73
Kentucky	2.4	83	88	84	79
Washington	2.4	90	90	79	91
North Carolina	2.1	89	91	87	80
Oregon	1.9	80	87	86	88
New York	1.5	88	90	87	82
United States	100.0	82.4	80.7	80.6	79.6

The average condition of spring wheat on July 1 was 92.7 as compared with 95.2 last month, 89.4 on July 1, 1908; 87.2 on July 1, 1907, and 87.0, the ten-year average on July 1.

Comparisons for important spring wheat states follow:

STATES.	Per cent. of U. S. acreage in state.	Condition			
		July 1, 1909.	June 1, 1909.	July 1, 1908.	10-Year July average.
North Dakota	34.6	95	98	93	85
Minnesota	31.2	92	96	90	86
South Dakota	17.4	94	94	95	89
Washington	4.9	90	93	65	90
United States	100.0	92.7	95.2	89.4	87.0

The average condition on July 1 of spring and winter wheat combined was 86.5 against 86.5 last month, 83.9 on July 1, 1908; 81.6 July 1, 1907, and 82.5, the ten-year average. The amount of wheat remaining on farms is estimated at 2.3 per cent. of last year's crop, or about 15,062,000 bushels, as compared with 33,797,000 on July 1, 1908, and 43,608,000, the average amount on farms on July 1 for the past ten years.

The average condition of the oats crop on July 1 was 88.3 as compared with 88.7 last month, 85.7 July 1, 1908, 81.0 July 1, 1907, and 86.8, the ten-year average on July 1.

Comparisons for important oat states follow:

The average condition of barley on July 1 was 90.2 as compared with 90.6 last month, 86.2 on July 1, 1908; 84.4 on July 1, 1907, and 88.3, the ten year average on July 1.

The average condition of rye on July 1 was 91.4 as compared with 89.6 last month, 91.2 on July 1, 1908; 89.7 on July 1, 1907, and 89.8, the ten-year average on July 1.

Traffic Club of Chicago.

The Traffic Club of Chicago made a trip over the lines of the Belt Railway of Chicago on July 20. The special train bearing the party left the Dearborn station at 10 a.m. and on its return arrived at the Union station at 4:30 p.m. The purpose of the trip was to familiarize the members of the club with the tracks to industries and the loading and unloading facilities of the Chicago switching district.

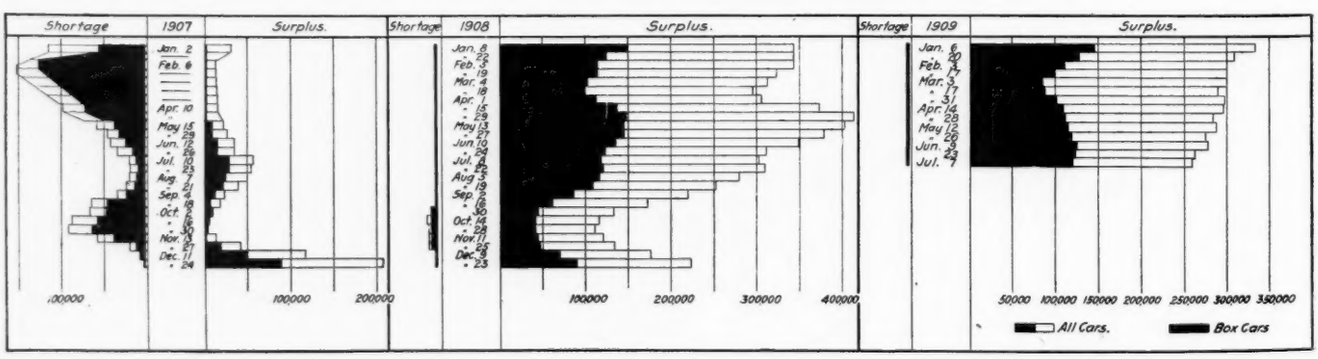
Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 51, giving a summary of car shortages and surpluses by groups from March 18, 1908, to July 7, 1909, says: "There is a further decrease in the surplus, bringing the total for this report down to 260,227. Of this reduction 2,536 are box and 1,009 coal and gondola cars. There are slight increases in groups 4 (South Atlantic), 6 (Northwestern), 9 (Southwestern), 10 (Pacific) and 11 (Canadian), which are more than offset by the decreases in the other groups. Nearly all the groups show small shortages, which are entirely local and do not as yet assume such importance as to call for outside assistance in filling them."

The accompanying table gives surpluses and shortages for the period covered by the report and the chart shows surpluses and shortages in 1907, 1908, 1909.

Car Surpluses and Shortages, March 18, 1908, to July 7, 1909, Inclusive.

	Number of roads.	Surpluses. Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
July 7, 1909	170	118,905	10,727	88,283	42,312	260,277	152	86	246	46	530
June 23, 1909	166	121,441	12,099	89,292	40,112	262,944	211	190	193	233	827
June 9, 1909	161	123,918	12,865	99,406	41,370	277,559	170	51	5	59	285
May 26, 1909	158	118,077	14,940	97,006	43,687	273,710	83	99	1,011	47	1,240
April 28, 1909	161	107,665	16,487	110,538	47,638	282,328	144	106	74	173	497
March 31, 1909	158	101,344	20,428	128,546	46,282	296,600	158	98	116	27	399
February 17, 1909	159	98,512	23,924	135,208	43,797	301,441	266	97	11	96	470
January 20, 1909	162	127,204	26,723	116,680	41,057	311,664	163	21	139	35	358
December 23, 1908	158	87,350	16,247	79,595	38,885	222,077	471	42	289	217	1,019
November 25, 1908	160	45,194	12,157	43,854	31,624	132,829	7,923	178	900	209	9,210
October 28, 1908	158	39,383	10,185	31,541	29,803	110,912	8,175	167	2,261	236	10,839
September 30, 1908	160	42,593	10,365	49,795	31,039	133,792	7,313	450	224	127	8,114
August 19, 1908	160	106,367	13,494	92,500	40,642	253,003	465	90	105	194	854
July 22, 1908	166	120,580	14,401	125,739	47,960	308,680	115	37	330	27	509
June 24, 1908	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
May 27, 1908	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
April 29, 1908	159	147,971	24,350	186,742	59,542	413,605	145	42	16	64	267
March 18, 1908	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007



Car Surpluses and Shortages in 1907, 1908 and 1909.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1909.
(See also issues of July 9 and 16.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama Great Southern	309	$186,281	$75,768	$294,402	$31,740	$51,390	$8,398	$88,337	$7,788	$187,653	$106,749	$401*	$11,356	$94,992	$45,228
Ann Arbor	301	84,485	33,223	126,462	19,405	14,888	3,357	48,178	4,064	89,892	36,570	3,813	15,621	24,762	2,415
Buffalo & Susquehanna	373	160,873	17,436	185,937	32,753	48,268	1,997	70,442	7,747	161,207	24,730	223*	4,000	20,507	1,383
Central Vermont	411	201,470	71,258	293,526	14,696	25,733	7,861	116,251	7,721	172,262	121,264	668	12,500	109,432	31,033
Chicago & Erie	269	268,682	61,546	367,608	30,310	85,534	14,998	167,803	8,554	307,199	60,409	204	10,578	50,035	‡5,546
Chicago, Cincinnati & Louisville	284	76,023	23,567	105,154	29,394	24,733	9,238	49,196	5,503	118,064	12,910*	.....	3,405	16,315†	‡4,959
Chicago Great Western	818	404,076	148,398	604,884	109,608	116,508	34,937	281,352	50,913	593,318	11,566	1,951*	17,916	8,301†	‡6,588
Chicago, Indiana & Southern	332	209,114	17,717	234,221	34,639	47,552	6,582	84,412	8,029	181,214	53,007	211*	12,500	40,297	27,469
Chicago, Lake Shore & Eastern	670	443,923	.....	489,014	47,181	82,459	1,370	115,711	5,387	252,108	236,906	.....	3,000	233,906	141,862
Chicago, Rock Island & Gulf	529	193,421	57,276	262,920	25,807	15,139	5,186	96,159	7,623	149,914	113,006	1,193*	6,261	105,552	77,130
Cincinnati, New Orleans & Texas Pac.	337	514,113	115,810	668,317	64,098	127,554	17,358	184,185	18,099	411,294	257,023	1,150*	20,000	235,873	59,084
Detroit & Mackinac	348	64,585	22,044	92,117	17,250	15,879	2,082	29,088	2,590	66,889	25,228	2,493*	6,850	15,885	‡9,898
Detroit, Toledo & Ironton	438	82,629	11,045	102,328	21,447	7,761	2,466	56,012	4,132	91,818	10,510	75*	6,979	3,456	‡4,938
Duluth, Missabe & Northern	282	1,086,331	33,970	1,124,717	70,594	109,777	1,709	145,049	9,199	336,328	788,389	3,657	47,005	745,041	751,697
Fort Worth & Denver City	454	239,126	121,535	379,139	58,315	65,330	7,840	135,274	15,119	281,878	97,261	835	10,067	88,029	51,728
Hocking Valley	347	307,599	63,738	396,278	72,287	46,295	7,821	128,954	12,167	267,524	128,754	5,588	18,963	115,379	119,132
Houston & Texas Central	789	294,298	103,641	426,102	69,176	73,660	16,514	201,964	20,427	381,741	44,361	.....	19,631	24,730	‡11,768
Long Island	392	244,694	508,232	783,570	97,469	112,551	12,222	287,953	17,346	527,541	256,029	83,190	27,236	311,983	‡27,937
Louisiana Ry. & Nav. Co.	341	72,905	13,532	91,556	24,779	15,287	4,048	39,390	5,703	89,207	2,349	.....	3,750	1,401†	‡11,933
Mason City & Fort Dodge	386	101,786	31,264	143,649	21,715	22,388	1,847	64,792	747	111,489	32,160	1,048	8,937	24,271	16,112
Morgans La. & Texas R.R. & S.S. Co.	351	199,103	90,773	311,489	30,365	33,333	9,646	123,677	13,239	210,260	101,229	269*	16,000	84,960	41,202
Nevada & California	422	70,548	24,116	103,450	12,977	16,053	664	37,253	1,724	68,671	34,779	195*	6,200	28,384	69,779
Northern Central	461	739,658	175,134	973,014	139,735	177,276	13,406	418,951	18,979	768,347	204,667	541	32,130	173,078	‡48,726
Northwestern Pacific	375	96,407	169,014	284,085	46,738	36,970	5,643	92,129	9,320	190,800	93,285	.....	8,955	84,330	11,736
Peoria & Eastern	351	149,864	51,753	219,097	34,863	34,027	5,105	87,272	4,565	165,832	53,265	.....	8,800	44,465	34,373
Rutland	468	162,520	71,304	261,291	46,051	48,442	6,488	94,662	5,241	200,884	60,407	.....	9,430	50,977	5,149
St. Louis & San Francisco	4,726	1,898,910	729,228	2,850,529	256,893	341,902	69,091	986,953	82,268	1,737,107	1,113,422	.....	120,781	992,641	459,338
San Antonio & Aransas Pass	727	199,605	70,666	286,652	47,617	42,490	4,150	128,344	8,383	230,984	55,668	.....	8,500	47,168	22,659
Southern Ry. in Mississippi	280	30,064	20,041	55,709	24,162	9,681	1,724	31,282	3,102	69,951	14,242*	.....	4,502	18,744†	.....
Texas & New Orleans	458	180,575	74,125	272,536	50,506	48,035	7,440	112,226	9,372	227,379	45,157	1,148	11,600	34,705	6,657
Toledo & Ohio Central	441	252,234	46,210	309,796	55,918	45,520	5,382	102,916	5,228	214,964	94,832	980	13,048	82,764	38,307
Toledo, St. Louis & Western	451	229,905	34,563	284,062	30,423	17,999	7,558	94,734	8,502	159,216	124,846	.....	14,000	110,846	25,490
Trinity & Brazos Valley	455	104,702	12,591	120,345	25,557	34,773	3,988	59,863	10,512	134,693	14,348*	.....	3,000	17,348†	52,188
West Jersey & Seashore	356	124,171	271,631	424,251	73,106	52,458	9,684	157,986	8,057	301,291	122,960	2,604	26,680	98,884	32,201
Wheeling & Lake Erie	442	419,025	41,735	484,703	32,903	115,613	7,144	153,507	15,724	324,891	159,812	5,585	21,847	143,550	131,916
Wisconsin, Minnesota & Pacific	271	30,555	11,739	46,060	17,529	4,462	911	20,361	255	43,518	2,542	39*	3,443	940†	‡1,727
ELEVEN MONTHS OF FISCAL YEAR.															
Alabama Great Southern	309	$2,076,263	$863,582	$3,266,910	$403,577	$600,000	$84,449	$1,068,219	$92,259	$2,248,504	$1,018,406	$6,670*	$125,883	$885,853	$419,112
Ann Arbor	301	1,048,738	413,736	1,564,774	216,165	206,834	33,917	619,873	44,067	1,120,856	443,918	24,892	133,561	335,249	11,505
Buffalo & Susquehanna	373	1,838,803	187,014	2,094,398	357,634	501,882	25,912	813,267	76,437	1,775,132	319,266	1,005*	44,000	274,261	102,055
Central Vermont	411	2,078,700	876,884	3,202,034	382,868	469,255	82,174	1,489,188	79,094	2,502,579	699,455	8,215	113,175	594,495	32,367
Chicago & Erie	269	2,893,311	705,672	3,929,872	354,983	910,580	132,078	1,873,035	88,177	3,358,853	571,019	3,354	122,991	451,382	210,309
Chicago, Cincinnati & Louisville	284	922,959	254,586	1,238,069	281,249	270,996	88,643	557,904	64,293	1,263,085	25,016*	.....	37,450	62,466†	38,459
Chicago Great Western	818	5,168,694	1,721,307	7,464,196	1,038,009	1,493,013	399,054	3,358,808	371 288	6,660,172	804,024	7,490*	203,163	593,371	‡373,123
Chicago, Indiana & Southern	332	2,298,275	216,200	2,597,691	302,810	509,556	83,759	1,016,003	77,345	1,989,473	608,218	13,110	150,042	471,286	107,009
Chicago, Lake Shore & Eastern	670	3,530,710	.....	3,891,227	327,274	850,627	13,182	1,169,661	66,229	2,426,973	1,464,254	.....	32,818	1,431,436	202,171
Chicago, Rock Island & Gulf	529	1,986,861	677,092	2,798,812	509,787	214,998	65,823	1,064,657	92,531	1,947,796	851,016	2,868*	47,339	800,809	‡13,603
Cincinnati, New Orleans & Texas Pac.	337	5,482,488	1,295,059	7,153,313	733,805	1,385,616	185,995	2,160,523	191,453	4,657,392	2,495,921	12,602*	217,756	2,265,563	816,327
Detroit & Mackinac	348	730,869	260,629	1,051,768	166,021	168,383	20,227	343,737	29,609	727,976	323,792	5,675*	78,495	239,622	‡28,345
Detroit, To'edo & Ironton	438	1,164,258	140,583	1,400,738	257,095	266,911	26,967	652,153	47,475	1,250,601	150,137	21	76,767	73,391	125,622
Duluth, Missabe & Northern	282	7,934,893	337,549	8,323,773	744,814	843,379	15,260	1,182,603	134,777	2,920,833	5,402,940	30,129	340,914	5,092,155	240,067
Fort Worth & Denver City	454	2,850,921	1,540,993	4,599,129	715,242	685,301	78,959	1,471,614	159,928	3,111,044	1,488,085	3,862*	98,881	1,385,342	51,887
Hocking Valley	347	4,452,249	762,062	5,409,396	596,907	1,186,119	82,374	1,663,507	132,909	3,661,816	1,747,580	46,562	215,094	1,579,048	378,905
Houston & Texas Central	789	3,851,008	1,277,666	5,469,030	740,395	795,815	176,720	2,079,425	215,486	4,007,842	1,461,188	.....	153,798	1,307,390	74,352
Long Island	392	2,474,836	4,665,167	7,436,601	944,118	1,146,416	142,760	3,350,298	198,468	5,782,060	1,654,541	787,878	299,593	2,142,826	598,302
Louisiana Ry. & Nav. Co.	341	830,955	123,806	1,022,451	264,943	141,590	38,093	438,461	59,041	942,128	80,323	.....	38,250	42,073	54,618
Mason City & Fort Dodge	386	1,249,759	393,280	1,748,932	203,144	271,439	18,812	747,407	7,731	1,248,533	500,399	7,611	80,683	427,327	‡46,893
Morgans La. & Texas R.R. & S.S. Co.	351	2,984,145	971,787	4,226,974	677,299	445,050	93,090	1,561,260	138,553	2,915,252	1,311,722	12,862	177,115	1,147,470	233,524
Nevada & California	422	694,941	242,051	1,020,258	128,267	130,890	8,452	383,619	21,145	672,373	347,885	4,026*	70,867	272,992	‡203,488
Northern Central	461	8,114,644	1,828,732	10,554,012	1,022,605	2,213,051	139,595	4,724,426	214,371	8,314,048	2,239,964	6,457	252,506	1,993,915	‡271,593
Northwestern Pacific	375	1,055,019	1,453,175	2,726,329	553,746	403,686	28,659	977,749	102,532	2,066,372	659,957	.....	99,605	560,352	85,554
Peoria & Eastern	351	1,753,653	606,222	2,574,033	325,823	419,302	57,140	1,012,453	50,425	1,865,143	708,890	.....	97,812	611,078	15,783
Rutland	468	1,435,858	905,938	2,635,325	391,244	375,573	69,069	998,783	65,912	1,900,581	734,744	.....	100,665	634,079	133,757
St. Louis & San Francisco	4,726	21,869,646	8,339,144	32,737,291	4,406,431	4,061,953	737,634	11,264,691	1,017,256	21,487,965	11,249,326	.....	1,380,610	9,868,716	1,025,315
San Antonio & Aransas Pass	727	2,513,595	794,499	3,493,334	520,197	414,643	47,282	1,371,592	97,572	2,451,286	1,042,048	.....	95,700	946,348	237,809
Southern Ry. in Mississippi	280	218,765	122,267	372,045	110,206	34,416	9,418	162,818	14,485	331,343	40,702	.....	22,511	18,191	.....
Texas & New Orleans	458	2,251,641	773,885	3,234,585	590,124	479,483	67,212	1,337,802	91,943	2,566,564	668,021	2,834*	107,845	557,342	7,262
Toledo & Ohio Central	441	3,098,157	550,765	3,777,869	530,695	634,467	58,415	1,256,311	58,375	2,538,263	1,239,606	25,874	149,895	1,115,585	5,353
Toledo, St. Louis & Western	451	2,498,246	420,456	3,134,448	345,718	383,202	65,501	1,072,007	87,384	1,953,812	1,180,636	.....	129,700	1,050,936	16,126
Trinity & Brazos Valley	455	1,657,129	150,264	1,839,788	372,922	291,594	47,315	881,724	126,844	1,720,399	119,389	.....	34,399	84,990	558,244
West Jersey & Seashore	356	1,358,577	2,918,511	4,537,267	733,324	616,383	111,584	1,894,575	87,270	3,443,136	1,094,131	58,329	216,939	935,521	‡57,142
Wheeling & Lake Erie	442	4,366,067	452,566	5,124,281	578,477	1,250,691	66,425	1,790,438	163,677	3,849,708	1,274,573	27,093	238,243	1,063,424	325,950
Wisconsin, Minnesota & Pacific	271	416,808	160,302	624,157	139,770	65,801	4,385	242,766	3,199	455,921	168,236	11	32,403	135,844	9,415

*Deficit. †Loss. ‡Decrease.

Traffic Through the Sault Ste. Marie.

The American canal at Sault Ste. Marie was open from April 27 to December 13, 1908, and the Canadian canal from April 21 to December 15. The freight tonnage carried through the two canals amounted to 41,390,557 tons, and was valued at $470,141,318, paying a total for freight transportation of $23,903,244. Of the total traffic 69 per cent. went through the American canal and 31 per cent. through the Canadian canal. Compared with 1907 there was a decrease of 33 per cent. in the traffic that went through the American canal and a decrease of 18 per cent. in the traffic that went through the Canadian canal. The following table shows the quantity and the price per unit of the various principal classes of commodities that passed through the two canals:

Items.	Quantity.	Price, per unit.
Coal, anthracite, tons	1,384,743	$5.47
Coal, bituminous, tons	8,517,717	2.50
Flour, bbls.	5,704,375	5.25
Wheat, bush.	106,041,873	1.01
Grain, other than wheat, bush.	43,458,583	.86
Iron ore, tons	24,650,340	3.40
Manufactured iron, tons	270,346	75.00
Pig iron, tons	18,962	17.50
Copper,* tons	101,735	256.00
Lumber, M. ft. B. M.	453,761	21.00
Salt, bbls.	547,223	.75
Building stone, tons	1,019	10.00
General merchandise, tons	842,901	150.00

*Refined and concentrates.

During the 54 years that the canals have been in operation the yearly traffic has increased from a minimum of 14,503 tons in 1855 to a maximum of 58,217,214 tons in 1907. The increase in tonnage of each year's traffic over that of the preceding year has been on an average about 20 per cent. The following table gives the unit commodity prices on articles passing through the canals in 1887 as compared with those of 1908:

	1887.	1908.
Salt, per bbl.	$1.00	$0.75
Copper, per ton	200.00	256.00
Iron ore, per ton	3.50	3.40
Lumber, per M ft.	18.00	21.00
Silver ore, per ton	153.79	.....
Building stone, per ton	10.00	10.00
General merchandise, per ton	60.00	150.00

INTERSTATE COMMERCE COMMISSION.

The commission has approved the agreement made between the complainants and the defendants in 185 cases representing suits for reparation on shipments of lumber. The claims in the cases grew out of the commission's decision in the yellow pine lumber cases—Tift v. Southern Railway, 10 I. C. C., 548, and Central Yellow Pine Assoc. v. Illinois Central, 10 I. C. C., 505.

Discrimination Between Cairo and Memphis.

E. Sondheimer Co. v. Illinois Central et al. Opinion by Chairman Knapp.

Defendants' tariff in force when complaint was filed permitted dealers to ship lumber into Memphis from southern and western territory, there unload, assort, grade and dry it, and within 90 days from the date of arrival, on presentation of paid expense bills covering movement into Memphis, to ship out the same lumber, or an equal tonnage of the same kind of lumber, to certain northern and eastern territory on rates which, combined with the rates into Memphis, were less than the combination of rates on Memphis, but not less than the through rate from the original shipping points to final destinations. The maximum "shrinkage" of rates so permitted was 4 cents per 100 lbs. No such privilege was permitted at Cairo, and the rates exacted on lumber handled through that point were the full locals in and out. Since complaint was filed the tariff in question has been superseded by a tariff which is admitted by complainant to have removed the alleged discrimination in rates. Owing to dissimilarity in circumstances and conditions surrounding the movement of lumber through Memphis and Cairo, the yarding and reshipping privilege at Memphis, if proper rates are applied thereunder, is not an undue discrimination against Cairo; but the rates in force through Memphis when complaint was filed, from competitive producing points in Mississippi to competitive consuming points in the territory involved, were unduly discriminatory against Cairo. Complainant given leave to make proof of any damage it may have suffered.

Unreasonable Express Rates to Idaho.

Boise Commercial Club v. Adams Express Co. et al. Opinion by Commissioner Lane.

On complaint attacking reasonableness of express rates from New York City to Boise and other points in southern Idaho; held (1) that carriers may not lawfully make a difference in rates based on the time of payment of charges; (2) that the through rates at present in effect in almost every instance violate the general principle that a through rate shall not exceed the lowest combination of locals between the same points. Defendants required to present to commission on or before October 1, 1909, a new basis of rates for the carriage of small packages from New York to Boise and points similarly situated.

Class Rates Encouraged.

Acme Cement Plaster Co. v. Lake Shore & Michigan Southern et al. Opinion by Chairman Knapp.

The complaint in this case alleges the unreasonableness of defendants' carload rates on the manufactured products of gypsum rock from Grand Rapids, Mich., to all points in Official and Southern classification territory, the state of Wisconsin, and that part of Illinois which is in Western classification territory; held that upon all the facts and circumstances disclosed by the record the present rate adjustment cannot be found unreasonable.

It is a matter of common knowledge that freight rates are controlled by various and varying conditions, and therefore the rates established in one section furnish no reliable standard by which to measure the reasonableness of rates in another section where dissimilar conditions prevail. It is well settled that the divisions accepted by a carrier cannot be taken as the measure of the reasonableness of its separately established rates.

The commission is disposed to encourage the making of class rates wherever practicable, because of their tendency to uniformity and stability. It is only in cases where it clearly appears that the inclusion of a given article in a class results in unreasonable charges, and a lower classification will not meet the demands of justice, that commodity rates are required to be established.

It is manifest that the rail carriers from Grand Rapids ought not to be required to make rates to meet water competition or to equalize for complainant the advantages of a business rival which moves its product to Chicago by its own water line.

While the amount shipped by a concern ordinarily has little or no bearing on the question of the reasonableness of the rates, it is of some significance where the shipments reach substantial proportions.

Freedom of Contracting for a Service.

Merchants Cotton Press & Storage Co. et al. v. Illinois Central et al. Opinion by Chairman Knapp.

Complaint was made against (*a*) the local rate of the principal defendant of 20 cents per bale on cotton from Memphis to South Memphis, Tenn.; (*b*) the allowance to a warehouse company of 50 cents per bale for compression of cotton at South Memphis, and (*c*) the allowance to the warehouse company of 10 cents per bale for switching and transfer to the warehouses of consignee in its plant. Held, that complainants' contention relative to the 20-cent local rate was waived on argument; that the allowances were not shown to be excessive; that they are made to cover the cost of service which the carriers may lawfully perform for themselves or hire others to perform; and that the facts on which complainants base their contention do not establish the charge of unjust discrimination or disclose any other violation of the act.

No violation of the act can be predicated solely on the fact that a carrier makes with one independent company a con-

tract more favorable than with another for a service which that carrier is bound or undertakes to perform. The act deals only with the obligation of carriers as carriers, and in no way attempts to regulate or interfere with matters not involving their duties to shippers or passengers as such.

A violation of the act is not established by merely showing that the owners of a majority of the stock of a corporation, which performs a certain service for a railway at a compensation involving no more than a reasonable profit, are also shippers of freight; but it goes without saying that neither carriers nor shippers can evade the prohibitions of the law by means of paper organization, nor would the utmost good faith in the matter of incorporation justify a relation which actually works out a violation of the statute. The commission has never hesitated to look through corporate forms and to examine the substance of transactions.

STATE COMMISSIONS.

The Railroad Commission of Missouri has issued a notice to certain of the railways operating in that state to file tariffs fixing a rate on blasting powder for 35 miles or less as required by the commission on April 6. The commission's order required a reduction from 54 cents per 100 lbs. in less than carloads to 15 cents.

The Texas Railroad Commission has acted favorably on the application of certain railways for authority to increase the rate on granite from Granite Mountain to Aransas Pass and Galveston from $1.25 to $1.65 per ton. The roads claimed that they were losing money in hauling granite a distance of 300 miles under the old rate.

The Cleveland, Cincinnati, Chicago & St. Louis has applied to the Railroad Commission of Indiana to set aside an ordinance passed by the Brookville City Council requiring the railway to erect and maintain safety gates at certain street crossings in that town. The appeal is based on the ground that electric signal bells would be better than gates and that gates would render the crossings more dangerous than without gates. A hearing will be had before the commission, at which time counsel for the city of Brookville will deny the power of the commission to revoke a reasonable ordinance passed by a town council.

COURT NEWS.

The Supreme Court of Oklahoma rendered two decisions on July 14, in which it passed on decisions that had been rendered by the State Corporation Commission. One of the cases was appealed by the Rock Island and involved the validity of an order of the commission requiring the employment of a telegraph operator at a small station. The court in this case reversed the decision of the commission, holding that where it is shown that receipts from commercial telegraph service are not sufficient to pay the expense of maintaining an operator at a station, an order requiring the maintenance of such an operator is not reasonable or just. The court said that a railway cannot reasonably and justly be required to keep an operator unless it is necessary either for (1) the safety or expedition of train service, or (2) the convenience of the public. The second case was one appealed by the Missouri, Kansas & Texas from an order requiring it to establish and maintain a station at Phillips, Okla. The court held that the order of the commission carried with it the presumption of a public necessity and that sufficient evidence had not been introduced by the railway to overcome this presumption.

The Russian claim to the political administration of Kharbin, and other places on its part of the Chinese Eastern Railway, has been given up, but there is a sort of joint Chinese-Russian rule, with the final appeal to Pekin and not to St. Petersburg. The conflict is said to have been due to differences in the Chinese and the Russian copies of the contract, which has been remedied by making a new one in French. All taxpayers, of whatever nation, vote for members of the administration of these places.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Frank K. Nebeker has been appointed an assistant attorney of the Oregon Short Line, with office at Salt Lake City, Utah.

F. L. Long, car accountant of the Raleigh & Southport at Raleigh, N. C., has been appointed to the new office of auditor.

J. M. McCarty has been appointed the auditor of the Memphis, Paris & Gulf, with office at Nashville, Ark., succeeding W. J. Peppard.

W. E. Fitzgerald, chief clerk to the auditor of the Houston & Texas Central, has been appointed auditor of the Texas Railroad Commission.

E. H. Harriman has been elected president of the Southern Pacific of Mexico, recently organized to operate the Southern Pacific lines in Mexico.

E. Askenwold has been appointed the auditor of the Spokane, Portland & Seattle and the Astoria & Columbia River, succeeding F. D. Kuettner, resigned.

J. C. Van Riper, president of the Apalachicola Northern, has been elected also the treasurer. S. P. Douglas has been elected the secretary, with office at St. Louis, Mo.

Edward L. Covert has been appointed the chief claim agent of the Pennsylvania Lines West of Pittsburgh in charge of personal injury claims, with office at Pittsburgh, Pa.

J. H. Barrett has been appointed the general claim agent of the Norfolk & Southern, in charge of loss and damage, overcharge, live stock, fire claims and personal claims. The positions of freight claim agent and claim agent have been abolished.

L. F. Linney, assistant secretary and auditor of the Colorado Springs & Cripple Creek District, has been elected the secretary, he remains also the auditor, with office at Colorado Springs, Colo. J. R. Fusselman, assistant treasurer, has been elected the treasurer, with office at Colorado Springs, and L. E. Katzenbach, assistant secretary and assistant treasurer of the Colorado & Southern, has been elected also the assistant secretary and treasurer of the Colorado Springs & Cripple Creek District, with office at New York.

Key Compton, general freight and passenger agent of the Baltimore Steam Packet Co. (Old Bay Line), has been elected vice-president of the Chesapeake Steamship Co., in charge of operations and traffic, with office at Baltimore, Md. Mr. Compton has been in the service of the Baltimore Steam Packet Co. for 23 years. E. E. Foster, general manager of the Chesapeake Steamship Co., has been appointed assistant to the president to perform such duties as shall be assigned to him by the president, and his former office has been abolished.

Operating Officers.

The office of W. C. C. Mehan, superintendent of the Grand Trunk Pacific, has been transferred from Melville, Sask., to Rivers, Man.

W. A. Johnson has been appointed the superintendent of the Interstate Railroad, with office at Stonega, Va., succeeding C. C. Crowe.

The office of A. J. Stone, general superintendent of the Erie division of the Erie, has been transferred from Jersey City, N. J., to New York.

D. C. Hershiser has been appointed the trainmaster of the West Virginia division of the Western Maryland, with office at Cumberland, Md., succeeding J. M. Bressler, deceased.

J. B. Murphy, trainmaster of the Mobile & Ohio at Tuscaloosa, Ala., has been appointed the superintendent of telegraph, with office at Jackson, Tenn., succeeding E. E. Torrey.

C. T. Boone, trainmaster of the Chicago & North Western at Council Bluffs, Iowa, has been appointed an assistant superintendent at Boone, Iowa, succeeding J. W. Doyle, resigned.

R. L. May has been appointed the car accountant of the Fort Worth & Denver City and the Wichita Valley Railway, with office at Fort Worth, Tex., succeeding F. M. Richardson, deceased.

Epes Randolph has been appointed the general manager and R. H. Ingram the assistant general manager of the Southern Pacific of Mexico, recently organized to operate the Southern Pacific lines in Mexico.

J. W. Walton, superintendent of transportation at Denison, Tex., of the Missouri, Kansas & Texas, has been appointed the general superintendent of the Missouri, Kansas & Texas Railway of Texas, with office at Dallas, Tex.

D. Pottinger, until recently general manager of the Intercolonial Railway at Moncton, N. B., is now a member of the managing board and his former office has been abolished. F. P. Grady has been appointed the general superintendent, with office at Moncton.

G. C. Starkweather, superintendent of the Arkansas river division of the Atchison, Topeka & Santa Fe at La Junta, Colo., has been appointed a superintendent of the Southern Kansas Railway of Texas and the Eastern Railway of New Mexico, with office at Amarillo, Tex.

R. L. Hatfield, roadmaster of the Missouri, Kansas & Texas at Houston, Tex., has been appointed the assistant superintendent of the Wichita Falls & Southern, the Wichita Falls & Northwestern and the Wichita Falls & Northwestern of Texas, with office at Wichita Falls, Tex.

P. B. McAtee, acting superintendent of the Denver & Rio Grande, has been appointed the superintendent of the Fourth division, with office at Alamosa, Colo. F. S. James has been appointed the assistant superintendent of the Second division, with office at Salida, Colo., succeeding F. S. Wilson.

H. A. Coomer, auditor, assistant secretary and purchasing agent of the New Mexico Central, has been appointed the acting superintendent, with office at Santa Fe, N. Mex. The office of traffic manager having been abolished, Mr. Coomer will until further notice perform the duties of that office.

Traffic Officers.

B. W. Warren has been appointed a traveling passenger agent of the Lehigh Valley, with office at Denver, Colo.

J. R. Jordan has been appointed a commercial agent of the Louisiana Railway & Navigation Co. at Baton Rouge, La.

R. E. Tipton has been appointed the general freight agent of the Texas City Terminal Railway, with office at Texas City, Tex.

M. J. Geary has been appointed a general agent, passenger department, of the Chicago, Rock Island & Pacific at Portland, Ore.

J. M. Jeffries has been appointed a soliciting freight agent of the Galveston, Harrisburg & San Antonio, with office at El Paso, Tex.

J. S. Stovall has been appointed a soliciting freight and passenger agent of the Georgia, Florida & Alabama, with office at Quincy, Fla.

J. F. Ross, Jr., has been appointed a soliciting freight agent of the Mobile & Ohio, with office at Mobile, Ala., succeeding A. V. B. Gilbert.

J. J. Stevens has been appointed a traveling freight and passenger agent of the New Orleans Great Northern, with headquarters at Bogalusa, La.

A. V. Davidson has been appointed a contracting freight agent of the Atchison, Topeka & Santa Fe at Denver, Colo., succeeding W. J. Van Camp, resigned.

Edward B. Elson has been appointed the immigration and industrial agent of the Memphis, Paris & Gulf, with offices at Kansas City, Mo., and at Nashville, Ark.

C. H. Squires, terminal agent of the Chicago, Rock Island & Pacific at Brinkley, Ark., has been appointed a division traveling agent, with office at Little Rock, Ark.

R. L. Gainer has been appointed a soliciting freight agent of the Cincinnati, New Orleans & Texas Pacific at Chicago, succeeding F. G. Lyons, resigned to go with another company.

W. V. Severns, traveling freight agent of the Chicago Southern, has been appointed a commercial agent, with office at Chicago, succeeding H. T. Bowie, resigned to go into other business.

The office of traffic manager on the New Mexico Central having been abolished, the duties of that office until further notice will be performed by H. A. Coomer, acting superintendent, with office at Santa Fe, N. Mex.

V. C. Russell, northwestern passenger agent of the Michigan Central at St. Paul, Minn., has been appointed passenger agent of the New York Central Lines, with office at Minneapolis, Minn., succeeding G. W. Alexander.

Laurence P. Tschopik, soliciting freight agent of the Southern Railway at Chattanooga, Tenn., has been appointed a commercial agent, with office at Montgomery, Ala., succeeding J. J. Stevens. I. O. Payne succeeds Mr. Tschopik, with office at Chattanooga, Tenn.

W. D. Stubbs, traveling freight and passenger agent of the Wabash at Los Angeles, Cal., has been promoted to general agent, with office at Portland, where an agency is to be opened August 1 for the handling of freight and passenger business. J. E. Holton succeeds Mr. Stubbs.

A. Landry, a general agent of the Atchison, Topeka & Santa Fe at New Orleans, La., has been appointed an assistant general freight agent at Galveston, Tex., succeeding F. S. Brooks, promoted. J. C. Sartelle, southern freight and passenger agent at Atlanta, Ga., succeeds Mr. Landry, and J. D. Carter, traveling freight and passenger agent at Atlanta, succeeds Mr. Sartelle.

L. E. Chaloner, whose appointment as general freight agent of the Seaboard Air Line was recently announced in these columns, began railway work in 1882 as a clerk in the office of the Missouri Pacific at Boston, and later was appointed a contracting agent and New England traveling agent, leaving that company to go to the Norfolk & Western as chief clerk to the general freight agent at Roanoke, Va. In January, 1893, he was appointed a commercial agent of the Norfolk & Western at Pittsburgh, Pa., and in June, 1899, went to the Ohio River Railroad as general freight and passenger agent at Parkersburg, W. Va. In September, 1901, he became division freight agent of the Baltimore & Ohio at Parkersburg. The following January he went to the Seaboard Air Line as assistant general freight agent at Savannah, Ga., and in August, 1906, was transferred to Norfolk, Va.

H. H. Roseman, general agent of the Cleveland, Cincinnati, Chicago & St. Louis at Cairo, Ill., has been appointed general traffic manager of the Illinois Traction, with office at Peoria, Ill. Mr. Roseman was born at Vincennes, Ind., July 7, 1869, and was educated at Vincennes University. He began railway work in 1884 as clerk to the master mechanic of the Baltimore & Ohio Southwestern at Vincennes. In 1886 his family moved to Evansville, Ind., and he became a messenger in the freight offices of the Evansville & Terre Haute. He held various railway positions and in 1894 was appointed assistant to the receiver of the Evansville & Richmond, now the Southern Indiana, and in 1895 was made general freight and passenger agent and auditor and treasurer. In 1897 the Evansville & Richmond was reorganized as the Southern Indiana and Mr. Roseman was appointed general traffic manager. In March, 1905, he entered the traffic department of the Cleveland, Cincinnati, Chicago & St. Louis, from which he resigned to accept his present position.

Nathaniel Duke, recently appointed general freight agent of the Delaware, Lackawanna & Western, was born on May 29, 1863, at Prince Frederick, Calvert county, Md. He began railway work in July, 1881, as a receiving clerk of the Baltimore & Ohio at the Camden station, Baltimore. Early in 1886 he went to the Chicago, Burlington & Quincy as bill clerk to the general freight agent, and later held various clerical positions until he became chief contracting agent at St. Louis, Mo., which position he resigned in December, 1892, and for a short time was out of railway work. In July, 1893,

he was appointed a contracting agent of the Great Northern at Chicago, resigning in October, 1894, to go as agent to the Elgin, Joliet & Eastern at Joliet, Ill. The following November he returned to the Great Northern as traveling freight and passenger agent at Detroit, Mich. In August, 1896, he became general westbound traveling agent of the Nickel Plate Fast Freight Line at Buffalo, N. Y., and was later made general westbound agent, with office at Chicago. In October, 1898, he became commercial agent of the West Shore, with office at New Haven, Conn., leaving this position to go to the Lehigh Valley in January, 1902, as northeastern agent at Boston and at New Haven. The following August he was appointed general northeastern freight agent of the Delaware, Lackawanna & Western at Boston, and was made general eastern freight agent in April, 1903, at New York, which position he held until his recent appointment as general freight agent.

Engineering and Rolling Stock Officers.

E. W. Wright has been appointed a roadmaster of the Interstate Railroad, with office at Stonega, Va.

W. E. Mann has been appointed a division engineer of the Grand Trunk Pacific, with office at Edmonton, Alb., succeeding R. W. Jones.

J. Parker Snow, bridge engineer of the Boston & Maine at Boston, Mass., who was recently appointed chief engineer, was born on November 18, 1848, at Concord, N. H. He graduated from the Thayer School of Civil Engineering, Dartmouth College, Hanover, N. H., in 1875, and later for about five years was in the employ of the Boston Bridge Works, where he first worked as draftsman and later engineer. In 1884, while working as bridge engineer in the office of J. W. Ellis, civil engineer, of Woonsocket, R. I., he did his first railway engineering work for the Providence & Worcester, now part of the New York, New Haven & Hartford. He went to the Boston & Maine as bridge engineer on June 5, 1888, which position he held until his recent appointment as chief engineer.

J. Parker Snow.

H. C. McCluer has been appointed the chief engineer of the Memphis, Paris & Gulf, with office at Nashville, Ark., succeeding E. La Manna.

S. S. Shields has been appointed the general air-brake inspector of the Atlantic Coast Line, with office at Wilmington, N. C., reporting to the general superintendent of motive power.

Thomas J. Burns, chief clerk, motive power department of the Michigan Central, has been appointed assistant to E. D. Bronner, superintendent of motive power, with office at Detroit, Mich.

Gordon Grant, inspecting engineer of the National Transcontinental Railway Commission of Canada, has been appointed the chief engineer, succeeding H. D. Lumsden, resigned.

R. Neikirk, supervisor of track of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., has been appointed supervisor of the Indianapolis Union Railway, with office at Indianapolis, succeeding G. W. Rohrman, resigned.

Special Officers.

Oakley D. Johnson has been appointed the superintendent of the Employment Bureau recently established on the Northern Pacific. His office will be at St. Paul, Minn. See item under General News.

Railroad Construction.

New Incorporations, Surveys, Etc.

ARIZONA & COLORADO.—An extension of three miles has been finished from Blacks, Ariz., to Gleeson.

ARKANSAS, LOUISIANA & GULF.—Organized to build from Monroe, La., north to Pine Bluff, Ark., with a branch to Crossett, in all 143 miles. The line is in operation from Monroe to Hamburg, Ark., 56 miles. According to press reports a bonus of $100,000 has been offered and right of way through Pine Bluff; also a site for the company's shops if the road is extended from Hamburg north to De Valls Bluff, about 130 miles from Hamburg. (March 19, p. 651.)

ATLANTA, BIRMINGHAM & ATLANTIC.—The receivers have authorized the completion of the 28 miles on the line from Pelham, Ala., northwest through Bessemer, to the Mulga mines, which are about 15 miles west of Birmingham. Grading on this line has been finished for over a year, but the bridging and track laying up to this time has not been authorized owing to the financial depression. Contract for five bridges has been let to the American Bridge Company and bids are asked for five additional bridges. (July 9, p. 79.)

BANGOR & AROOSTOOK.—Work is now under way on three important extensions as follows: Cut-off from Stockholm, Me., on the Van Buren division, via Perham, Washburn and Mapleton, to Squa Pan or Masardis, on the Fort Kent division, six miles below Ashland, 47 miles; extension from Van Buren along the St. John river to Grand Isle, 15 miles; extension from Fort Kent up the valley of the St. John to St. Francis, 17 miles. An extension is also projected from Fort Kent to Van Buren, 40 miles. (May 14, p. 1051.)

CAIRO & NASHVILLE INTERURBAN.—Incorporated in Tennessee, with $25,000 capital and office at Paris, Tenn., to build from a point near Fulton, Ky., southeast to Paris, thence east to Nashville, about 140 miles. The incorporators include: T. C. Rye, D. B. Sweeney and C. E. Steaks.

CALIFORNIA ROADS.—Financial arrangements are being made by G. W. Cartwright, of Fresno, Cal., associated with capitalists of that place and of Los Angeles, to build from Coalinga, Cal., northeast to Fresno, about 70 miles. The work is to be started this year.

CANADIAN NORTHERN.—The railroad commission has approved the route map for a branch from Prince Albert, Sask., southwest to Battleford. Also for branches in Alberta and Saskatchewan; from Strathcona, Alb., south to Calgary; Stoney Plain, Alb., southwest to the Brazeau river, and from Maryfield, Sask., west to Lethbridge, Alb.

Vice-President Mann is quoted as saying that work is now under way on 200 miles in Saskatchewan, 150 in Alberta and 100 in Manitoba. The company is also relaying about 200 miles of the main line between Lake Superior and Winnipeg with heavier rails.

CANADIAN PACIFIC.—The railroad commission has approved route maps for lines to be built from a point near Langdon to a point near Red Deer, Alberta, and from Weyburn, Sask., to Lethbridge.

Plans have been filed for an extension of the Nicola, Kamloops & Similkameen from Merritt, B. C., south to Similkameen.

On the Ontario division the Victoria Harbor branch has been opened for business from Coldwater Junction, Ont., westward to Victoria Harbor, 13.3 miles.

CAROLINA, VIRGINIA & WESTERN.—Incorporated in Virginia, with $25,000 capital and office at Amherst, Va., to build from Strathmore, Fluvanna county, Va., southwest via Danville to Milton, N. C., about 125 miles. T. O. Troy, president; B. R. Harrison, secretary, and H. C. Joyner, of Amherst, and N. R. Fitzgerald, of Danville, are the incorporators.

CHICAGO, BURLINGTON & QUINCY.—An officer writes that the contract recently let to the MacArthur Brothers Co. was for grading and bridging on 42 miles of an extension from Kirby, Wyo., south through the Wind River canyon, to a connection with the Chicago & North Western, at Shoshoni. The grading will be heavy and will involve the excavation of 2,200,000 cu.

yds. of earth, 500,000 cu. yds. of loose rock and 800,000 cu. yds. of solid rock, also the construction of 10 short tunnels. The exact amount of masonry, concrete and trestling has not yet been completely estimated. It is estimated that this contract will amount to about $1,500,000. Part of the work is already being sublet, principally the lighter grading, by F. C. Hitchcock, general manager of the MacArthur Brothers Co., who has established headquarters at Thermopolis, Wyo. Negotiations are pending to use the Chicago & North Western line to Orin Junction. (July 9, p. 79.)

Colorado River & Yuma Southern.—Organized with a capital of $1,000,000 to build from Yuma, Ariz., southward to tidewater at the head of the Gulf of California, also from Yuma north through Bouse, Vicksburg, northern Arizona and Utah to a connection with the San Pedro, Los Angeles & Salt Lake. Surveys now being made by W. F. Bordwell. The project is being backed by J. S. Speece, L. E. Karr, H. C. Kester, of Yuma; N. P. Larson, recently of North Star, Ariz., and H. S. Johnson, of Brawley, Cal.

Connell Northern.—See Northern Pacific.

Denver, Laramie & Northwestern.—An officer writes that the Greeley Terminal Railroad was organized to procure terminals and rights of way through Greeley, Colo., for the Denver, Laramie & Northwestern. The Terminal company is capitalized at $300,000, with office in Greeley, and proposes to build lines out of Greeley and put up terminal stations. The Terminal company will be controlled exclusively by the Denver, Laramie & Northwestern. The incorporators include: W. L. Clayton, C. D. Todd, of Greeley; C. M. Day, C. S. Johnson, C. Felt, A. E. Welby and J. D. Milliken, all of Denver. (April 2, p. 774.)

A press report says that construction work will be started soon from Greeley southwest to the new town of Milliken, 12 miles.

Detroit, Lansing & Grand Rapids (Electric).—Organized in Michigan, with $25,000 capital and office at Detroit, to build from Detroit, Mich., west via Lansing to Grand Rapids, about 150 miles. The projectors include: O. H. Lau and H. M. Wallace, of Detroit; G. Valentine, W. T. Utley and R. G. St. Johns.

El Paso & Southwestern.—A new branch of the Western division, called the Courtland branch, from Douglas, Ariz., east to Courtland, 35.7 miles, has been opened for business.

Fort Smith, Subiaco & Eastern.—Building from a connection with the Arkansas Central at Paris, Ark., east to Subiaco, six miles, thence northeast to Scranton, seven miles, with eight miles of branches. Track laid on six miles. The work is being done by the company's men. Address Henry Stroup, Paris.

Grand Trunk Pacific.—The railroad commission has approved the plans for a branch from the main line at Young, west of Watrous, Sask., north to Prince Albert. Also for branch lines from Bigger, Sask., north to Battleford; Regina, Sask., northeast via Melville to Yorkton. Part of the latter is to form a section of a through line from the United States boundary at North Portal, Sask., northeast to Le Pas, thence to a point on Hudson bay. Surveys are now under way from Yorkton to Le Pas and, when finished, contracts, it is said, will be let for the work.

Greeley Terminal Railroad.—See Denver, Laramie & Northwestern.

Idaho & Washington Northern.—Work on the northern terminus of the extension under construction from Newport, Wash., north to Ione, 53 miles, is being rushed to early completion. Grading on the extension is about 80 per cent. finished and track laying is now in progress. It is the intention to have the line ready for operation early in November; the first 13 miles from Newport north to Dalkena is now in operation. (June 4, p. 1187.)

Indianapolis, Cloverdale & Vincennes Traction.—Contract is said to have been given to J. J. Burns & Co., Chicago, to build from Indianapolis, Ind., southwest to Vincennes. E. N. Bowman, president; W. T. Devor, vice-president, and D. H. Jackson, secretary.

Interstate Railroad.—This road has been extended from Appalachia, Va., east to Norton, 10 miles.

James River Valley & North Western.—An incorporator writes that the proposed route is from Blunt, S. Dak., on the Chicago & North Western, north by Onida to Gettysburg; also on the C. & N. W., with a branch from Onida, east to Hitchcock, on the C. & N. W., in all 130 miles. A. K. Gardner, Huron, S. Dak., may be addressed. (July 16, p. 125.)

Kentwood & Eastern.—A new branch, called the Bolivar Line, has been opened for business from Bolivar Junction, La., south to Camp Three, 14 miles.

Marked Tree, Newport & Western.—An officer writes that contracts are to be let about September 1 for building from Marked Tree, Ark., westerly via Harrisburg, Waldenburg and Weiner, about 49 miles. E. Ritter, president, and W. W. Cate, general manager, Marked Tree, and C. B. Bailey, chief engineer, Wynne. (July 16, p. 125.)

Mexican Southern.—According to press reports an extension is to be built from Oaxaca south to a point on the Pacific coast, probably to Puerto Angel. Two or three branches are also projected; in all, 200 miles.

Minneapolis, St. Paul & Sault Ste. Marie.—An officer writes that track laying on the extension from Brooten, Minn., northeast to Duluth, 189 miles, is about finished. The company intends to open the line for freight traffic about August 15 and for passenger traffic by September 1. (March 19, p. 656.)

Mississippi Western.—Organized to build from Meridan, Miss., southwest via Mendenhall and Raleigh to Natchez. Financial arrangements have been made and work is to be started about September 1. J. W. Hudson, vice-president; C. F. Scofield, secretary; R. L. Corrington, treasurer, all of Hazelhurst, Miss., and the Hon. A. H. Longino, general counsel, Jackson, Miss. (July 9, p. 79.)

New Brunswick Roads.—Contract is said to have been let to Wheaton Brothers, of Folly, N. S., to build a 16-mile line from the Drummond mines to Bathurst, N. B.

New York Central & Hudson River.—An officer writes that application has been made to the Public Service Commission to issue bonds for improvements on the Spuyten Duyvil & Port Morris Railroad. The plans call for a cut-off tunnel about 671 ft. long, at Spuyten Duyvil, to avoid the sharp curves where the tracks join the Hudson River division. It is probable that these improvements will not be commenced this year.

New York, New Haven & Hartford.—An officer of the New York, Westchester & Boston writes that contract was let in May to the Ferguson Contracting Co. for grading and masonry work in New Rochelle, N. Y. Bids were received July 2 for similar work from 174th street, New York City, through Mount Vernon to North Pelham, and it is expected that the contract will be let soon. (July 9, p. 79.)

New York, Westchester & Boston.—See New York, New Haven & Hartford.

Nicola, Kamloops & Similkameen.—See Canadian Pacific.

Nipissing Central (Electric).—Contract is said to be let to the Nova Scotia Construction Co., Sydney, Cape Breton, N. S., to build from Cobalt, Ont., to Haileybury.

Norfolk & Western.—The Tug Fork branch of the Pocahontas division has been extended from Pageton, W. Va., to Anawalt, three miles. A new section of this branch has also been opened for business from Gary, W. Va., to Filbert, five miles.

Northern Pacific.—An officer writes that the Connell Northern, recently incorporated in the state of Washington, with $50,000 capital, to build from the Northern Pacific at Connell, in Franklin county, north to Adrian, on the Great Northern and the Northern Pacific, will be built and operated by the Northern Pacific. It is expected that work will be started soon. (June 18, p. 1329.)

According to press reports bids have been opened for a line from Missoula, Mont., west via the Lola Pass to Pasco, Wash.

Contracts are said to be let for work on the first 100 miles of the Missouri River branch from Glendive, Mont., east to Mandan, N. Dak.

OKLAHOMA & GOLDEN CITY.—An officer writes that the projected route is from Enid, Okla., northeast to Jefferson City, Mo., 375 miles. Part of the surveys are made and a bond issue has been arranged for. Construction on 28½ miles in Missouri will be started in August. The company wants to hear from contractors to build the line. W. S. Hawkins, chief engineer, Pawhuska, Okla. (March 26, p. 727.)

PACIFIC & EASTERN.—An officer writes that this company, which now operates 12 miles of line, from Medford, Ore., to Eagle Point, is building with its own men an extension from Eagle Point to Butte Falls, 20 miles. The first three miles is finished. (July 9, p. 79.)

PARIS & MT. PLEASANT.—Permanent surveys are said to be under way from Paris, Tex., southeast to Mt. Pleasant, 50 miles. Right-of-way has been secured from Paris to Sulphur, and it is expected to begin construction work on this section in about two months. (June 25, p. 1546.)

PENNSYLVANIA ROADS.—Final surveys are said to be made by the Ellwood City Coal, Oil & Gas Company to build from the Baltimore & Ohio at Frombelle, Pa., five miles south of Ellwood City, northeast to a connection with the Western Allegheny, thence to the Bessemer & Lake Erie at Grove City, about 30 miles, to open up coal fields. T. Liggett, vice-president and general manager of the Western Allegheny of Pittsburgh, associated with capitalists interested in the Great Lakes Coal Company, are said to be back of the project.

PHILADELPHIA & READING.—An officer writes that work on the abolishing of grade crossings on the line of the Philadelphia & Reading between Green street and Wayne Junction in the city of Philadelphia is being rapidly prosecuted. Contracts have been let for raising the tracks for the entire distance, and work has been started between Columbia avenue and Green street. Between Broad street and a point near Columbia avenue the main construction is rapidly approaching completion. All of the masonry work has been finished, the filling in is now under way, and the remaining bridges are being put up. The work is being carried on jointly by the city of Philadelphia and the Philadelphia & Reading, and includes the removal of 29 grade crossings on a section of 3.7 miles, at an estimated cost of $7,500,000. (April 16, p. 872.)

SAN DIEGO, EL PASO & ST. LOUIS.—Projected from El Paso, Tex., northeast through southeastern New Mexico to the Red river, at the Texas-Oklahoma state line, about 500 miles. An officer writes that preliminary estimates for building 180 miles of the line are being made. The company wants prices from contractors for loose earth and for solid rock work; boring tunnels through loose and solid rock, including supporting and lining where necessary; building concrete and stone culverts, bridges and waterways; bridge and trestle timbers and iron; ties, rails, fastenings, frogs, switches, track tools, stock guards; telegraph and telephone poles, brackets, insulators and wire, and fence posts and fence wire. Contractors sending in preliminary estimates will be given an opportunity to submit final proposals before contracts are let. P. A. McCarthy, chief engineer, El Paso. (March 26, p. 727.)

SANOODY VALLEY.—Surveys are said to be made, rights-of-way secured and work is now under way on this line, projected from De Kalb, Miss., east to a connection with the Mobile & Ohio, about 25 miles. An extension is to be built from De Kalb west to the Mobile, Jackson & Kansas City. J. P. Hornaday & Company, 30 Church street, New York, are interested. Contract let to J. B. Taylor & Company, Hudson Terminal building, to build from De Kalb to the Mobile & Ohio. (March 19, p. 657.)

SUMTER & CHOCTAW.—This road has been extended from Whitfield, Ala., to Persimmon Grove, four miles.

SOUTHERN PACIFIC.—According to press reports final surveys are being made for a branch from Lordsburg, N. Mex., to Durango, Colo., on the Denver & Rio Grande, about 350 miles.

The San Francisco, Holland & Klamath Falls branch of the Shasta division has been extended from Warden, Cal., east to Klamath Falls, 14 miles.

SPRINGFIELD, BEARDSTOWN & QUINCY.—An officer writes that bids are to be asked for in August for building 57 miles from Beardstown. The projected route is from Springfield, Ill., west via Beardstown to Quincy, about 100 miles. Bids should be addressed to W. J. Gates, vice-president and general manager, Springfield. (July 16, p. 126.)

SPUYTEN DUYVIL & PORT MORRIS.—See New York Central & Hudson River.

TEXAS ROADS.—According to a statement recently issued by the Railroad Commission of Texas, for the year ended June 30, 1909, about 376 miles of new main line was built in Texas during the year, as follows:

		Miles
Wichita Falls & Southern..	Olney to Newcastle	12
Texas State Railroad	Meshaw to Palestine	15
Shreveport, Houston & Gulf	Huntington to Manning	11
Roscoe, Snyder & Pacific..	Snyder to Fluvanna	20
Asherton & Gulf	Asherton to Light	12
Quanah, Acme & Pacific...	Acme to Sands	5
Abilene & Southern	Abilene to Bradshaw	27
Groveton, Lufkin & North'n	Groveton to Vair	21
Texas Southeastern	Lufkin to Diboll	17
St. Louis Southwestern...	Broaddus to White City	11
Texas & New Orleans	Gallatin to Rusk	9
Texas & Gulf	Center to Zuba	21
Stamford & Northwestern.	Stamford to West	47
Kan. City, Mex. & Orient..	Truscott to Red River	59
	Bet. Sweetwater and San Angelo..	28
Chic., Rock Island & Gulf.	Wildorado to Ontario	20
Trinity Valley Northern...	Dayton to Rosewood	10
Artesian Belt	Kirk, southward	10
Marshall & East Texas....	Marshall, south	2
Burr's Ferry, Browndel & Chester	Turpentine to Browndell	19
Total		376

Work is now under way on about 433 miles by a number of companies as follows:

Atch., Top. & Santa Fe....	Cutoff bet. Coleman, Tex., and Texico, N. Mex.	110
Stamford & Northwestern..	Aspermont, west	36
Pecos & Northern Texas (A., T. & S. F.)	Plainview to Lubbock	42
Tucumcari & Memphis (C., R. I. & Gulf)	Ontario to Tucumcari	70
Kan. City, Mexico & Orient.	Bet. Sweetwater and San Angelo..	37
Timpson & Henderson....	Ragley to Henderson	30
Enid, Ochiltree & Gulf....	Dalhart to Ochiltree	108
Total		433

L. C. Hill and associates have asked residents of San Antonio, Tex., for a bonus of $250,000, also land for terminal stations and rights-of-way through the city and Bexar county. If the above conditions are complied with, the project to build from San Antonio south to Brownsville will be carried out. The promoters include: E. H. Benoist, of St. Louis; G. B. Miller, J. A. Browne, H. L. Borden, J. Beemer, A. Haywood and S. H. Jackson, of Falfurrias; R. S. Dilworth, W. Green and J. J. Stevens, all of San Antonio.

TONOPAH & TIDEWATER.—According to press reports, contract has been let for building a 13-mile branch from Tecopa, Cal., to the Tecopa Lead Mines in Inyo county.

VEBLEN & NORTHWESTERN.—According to press reports, the promoters have secured a loan of $2,000,000 from the St. Louis Union Trust Co. to build the line. The company was organized to build from Veblen, S. Dak., northeast to Hankinson, N. Dak., about 30 miles, and has since amended its charter to change the proposed route from Veblen east via White Rock to a connection with the Chicago, Milwaukee & St. Paul near that place, and eastward to Barrett, Minn., on the Minneapolis, St. Paul & Sault Ste. Marie; also for an extension of the line southwest to Aberdeen, S. Dak. M. J. Hawley, president, Brandt, S. Dak. (April 9, p. 821.)

WHEELING & LAKE ERIE.—The low grade cut-off line, built under the name of the Sugar Creek & Northern, from Bolivar, Ohio, northwest via Brewster to Orrville, 22 miles, is to be put in operation on July 25. Work is now under way on the car yard, roundhouse and shop buildings at Brewster. At the time work on the line was suspended late in 1907 three-quarters of the grading had been finished and about eight miles of track laid. (Dec. 18, p. 1610.)

WICHITA, KINSLEY, SCOTT CITY & DENVER AIR LINE.—An officer writes that bids will be asked for early in September to build from Kinsley, Kan., east to Wichita, about 125 miles. This company is organized with $100,000 capital. L. S. Smith, president, and T. E. Luttgerding, general manager, Kinsley.

Railroad Financial News.

American Light & Traction.—The regular 2 per cent. dividend, together with 1 per cent. extra in cash and a stock dividend of 10 per cent., has been declared on the common stock.

Atlanta, Birmingham & Atlantic.—A press despatch dated Boston says that a definite plan for reorganization will not be worked out until the road is finished into Birmingham. The receivers recently sold to Clark, Dodge & Co. and Moffat & White, both of New York, $3,250,000 two-year 5 per cent. receivers' certificates, the proceeds of which are to be used to complete about 13 miles of unfinished main line into Birmingham.

Beaumont & Great Northern.—See International & Great Northern.

Belt Railroad & Stock Yards Co. of Indianapolis.—This company has sold to Estabrook & Co., Boston, Mass., $1,000,000 4 per cent. 30-year bonds to retire $1,000,000 outstanding first mortgage 6 per cent. bonds maturing April 30, 1911. The property of the company includes 14 miles of belt road and is leased to the Indianapolis Union.

Boston & Maine.—Press despatches say that at a meeting of the Boston Railroad Holding Co. last week it was agreed to offer $140 per share for the $10,994,800 Boston & Maine stock bought by John L. Billard from the New York, New Haven & Hartford. The stock will be paid for, $125 in 50-year 4 per cent. bonds of the Holding company and $15 in stock of the Holding company taken at par. The offer is subject to the approval of the Massachusetts Railroad Commission. The Boston News Bureau says that of the total amount involved in the purchase, $15,392,720, part is to be raised by the issue of $13,743,500 4 per cent. 50-year bonds of the Holding company, which the New York, New Haven & Hartford will take and then guarantee and will eventually sell to the public. The Holding company will also issue $1,649,220 stock, making with the $100,000 stock already issued a total of $1,749,220, of which the five directors will own $100,000 and the New Haven company $1,649,220. It is then figured that the Holding company will receive 6 per cent. dividends on its Boston & Maine stock, amounting annually to $659,688, and will pay 4 per cent. on its own bonds, amounting to $549,740, which leaves a yearly balance of $109,948, or about 6.2 per cent. on the stock. (June 11, p. 1221.)

Boston Railroad Holding Co.—See Boston & Maine.

Central New England.—The committee representing the minority general mortgage income bondholders, C. S. W. Decker, chairman, in asking for an extension of the deposit agreement for one year, say in part:

"Your bonds, and the mortgage securing them, provide that holders of a majority may agree to the substitution of a bond at a fixed rate of interest for the income bonds. The New Haven road will attempt to reduce the interest on these bonds from 5 per cent. to 4 per cent. or less, to the advantage of the bonds which it asks for under the new mortgage and to the detriment of holders who have no other interest in the property. There is no question that this is illegal.

"The New Haven company, when before the Public Service Commission, could not deny that the road is able to pay 5 cent. on the general mortgage bonds amounting to $362,500 per annum, while asking for an immediate issue of $9,533,000 bonds, on which interest at 4 per cent. would amount to $381,320 per annum. Your committee showed to the commission that there cannot be more than $911,876 of general mortgage bonds not owned by the New Haven road.

"If the Public Service Commission does not afford relief, it is at least likely to dispose of this application with such an expression of opinion as will convince the New Haven road that its scheme cannot succeed. But the commission's decision may not be rendered by August 1, 1909. Your committee, therefore, ask an extension of the time of the deposit agreement to August 1, 1910, and will be pleased to receive your formal assent, but will assume that such assent is given unless before August 1, 1909, you advise them that the proposition is not satisfactory to you." (April 16, p. 872.)

Chicago & North Western.—See Chicago, Burlington & Quincy.

Chicago, Burlington & Quincy.—This company is negotiating for trackage rights over the Chicago & North Western from Shoshoni, Wyo., to Oris Junction, 170 miles. The C., B. & Q. is extending its line from Kirby, Wyo., south to Shoshoni. The proposed line and trackage rights will give it a through route from its own lines in northwestern Wyoming to a connection with the Colorado & Southern at Orin Junction.

Cincinnati, Hamilton & Dayton.—Judson Harmon, the receiver, has been discharged, preparatory to the taking over of the C. H. & D. by the Baltimore & Ohio, but at present the property of the C. H. & D. is still under the supervision of the United States Court.

Colorado & Southern.—See Chicago, Burlington & Quincy.

Delaware, Lackawanna & Western.—The stockholders have ratified the 15 per cent. stock dividend declared by the board of directors at the time of the declaration of the 50 per cent. extra cash dividend. (July 9, p. 80.)

Geneva, Corning & Southern.—The New York Public Service Commission, Second district, has authorized this company, which is leased by the New York Central & Hudson River, to issue $3,744,000 50-year 4 per cent. refunding bonds. The bonds are to be guaranteed by the New York Central & Hudson River and are to be sold at not less than 95. The New York Central & Hudson River is also authorized to guarantee dividends on the stock of the Geneva, Corning & Southern.

See New York Central & Hudson River.

International & Great Northern.—T. J. Freeman, receiver and general manager, denies the report that this road has bought the Beaumont & Great Northern.

Louisville & Atlantic.—As previously announced, the Louisville & Nashville bought some time ago nearly all of the outstanding securities of the Louisville & Atlantic. The governor of Kentucky has turned over to the state attorney-general an appeal from citizens of Richmond, Ky., against the acquisition of the Louisville & Atlantic by the Louisville & Nashville. The Louisville & Atlantic runs from Beattysville, Ky., to Versailles, 101 miles, crossing the Louisville & Nashville at Richmond.

Louisville & Nashville.—See Louisville & Atlantic.

New York Central & Hudson River.—The New York Public Service Commission, Second district, has granted permission to the Geneva, Corning & Southern and the New York Central & Hudson River to make a $10,000,000 first and refunding mortgage on the property of the G., C. & S. to secure bonds, of which the New York Central is to issue at once $3,744,000 of its own 50-year 4 per cent. bonds and sell them for not less than 95. The Central is authorized to guarantee dividends on the stock of the Geneva, Corning & Southern, as provided in the lease.

The Public Service Commission has also authorized the Spuyten Duyvil & Port Morris to make a mortgage on the property of the Spuyten Duyvil & Port Morris securing bonds, on which the New York Central is to issue at once $2,500,000 of its own first series 3½ per cent. 50-year bonds and sell them at not less than 95. Of the proceeds, $2.341,000 is to reimburse the New York Central for expenditures previously made, including the electrification of the road, and the remaining $159,000 is to be used for beginning work on a new four-track tunnel through Spuyten Duyvil hill See New York Central & Hudson River under Railroad Construction.

See also Geneva, Corning & Southern.

New York, New Haven & Hartford.—See Boston & Maine.

St. Louis, Iron Mountain & Southern.—An annual dividend of 4 per cent. has been declared. Last year the dividend was 5 per cent. In 1907, 10 per cent. was paid; in 1906, 14 per cent.; in 1905, 7 per cent. was paid; from 1902 to 1904. 10 per cent. was paid yearly.

SANTA FE, LIBERAL & ENGLEWOOD.—The following have been appointed at a regular meeting of the bondholders to act as a general reorganization committee in the interest of owners of all bonds and stocks of the Santa Fe, Liberal & Englewood and the other railway fuel and water companies formerly under the control of E. D. Shepard & Co.: Charles H. Lee, W. Bayard Cutting, Manton B. Metcalf, A. B. Farquhar, William S. Grant, Jr., W. A. Harder and L. Laflin Kellogg, with Robert Lawrence as secretary and Kellogg & Rose as counsel, 115 Broadway, New York.

SEABOARD AIR LINE.—It is unofficially said that under the reorganization plan announced July 1 the $3,000,000 series A 6 per cent. receivers' certificates due July, 1911, or earlier, are to be called for payment on December 1, 1909, and the $4,250,000 5 per cent. receivers' certificates series C due January 1, 1912, or earlier, are to be called on January 1, 1910.

The coupons maturing April 1, October 1, 1908, and April 1, 1909, on the $12,775,000 first mortgage 4 per cent. bonds of 1900 are being paid in cash on the deposit of bonds under the readjustment plan.

SOUTHERN INDIANA.—Of the total issue of $7,537,000 first mortgage 4 per cent. bonds, $6,813,000 have been deposited with the protective committee, A. G. Hodenpyl, chairman. The committee under date of July 1 says in part:

"In view of the fact that the road is earning considerably more than the interest on its first mortgage bonds, the committee has recommended that the receiver apply to the court for authority to pay on August 1, 1909, one of the first mortgage interest coupons in default, the expectation being that the receiver will be able to pay another interest coupon in February, 1910, thus leaving two interest coupons in default. In this connection the committee has taken into account payments which the receiver will be required to make on Nov. 1, as follows:

Principal of car trust notes ($136,152) and locomotive notes ($9,687)	$145,839
Interest on receivers certificates, car trust notes and locomotive notes	26,745
Taxes (estimated)	41,571
Total	$214,155
To which add the amount required to pay a half-yearly interest coupon on first mortgage bonds	150,740
Total	$364,895
To meet these payments, the receiver, it is estimated, will have $430,981, as follows:	
Cash in bank, May 31, 1909	$180,981
Estimated net earnings, June 1 to Oct. 31, $50,000 per month	250,000
	$430,981

"It has seemed to the committee that, if necessary, these principal payments on account of the purchase of equipment should be funded by the issuance of a small amount of receiver's certificates rather than that the entire earnings of the road should be devoted to payments on capital account.

"The committee has recently gone over the property thoroughly. The condition of the roadbed, bridges and buildings was found to be excellent and the rolling stock to be in good working condition.

"The committee expects that a reorganization satisfactory to the first mortgage bondholders will be effected."

SOUTHERN PACIFIC.—The time for converting the $74,863,400 7 per cent. preferred stock into common stock or into new 4½ per cent. bonds, or its surrender for $115 cash per share, expired July 16, and the company announces that the holders of all but between one and two million dollars preferred stock have been heard from and nearly all have elected to convert their preferred stock into common stock.

SPUYTEN DUYVIL & PORT MORRIS.—See New York Central & Hudson River.

TENNESSEE CENTRAL.—The Southern Railway and the Illinois Central have brought suit against the Tennessee Central for $112,000 alleged to have been paid out on claims against this road while it was jointly operated by the Southern and the Illinois Central. The Tennessee Central has now filed a cross bill asking damages to the amount of $640,000 on the ground that the property of the road was damaged while it was operated by the defendants and that contracts with it were broken. A contract was made in 1905 by the Tennessee Construction Co., which controls the Tennessee Central, giving the Southern and the Illinois Central an option on buying the securities of the Tennessee Central within three years. The Tennessee Central was operated by the Southern and the Illinois Central until June 30, 1908, when the option expired and the two roads announced that they decided neither to renew nor exercise the option.

UNION PACIFIC.—It is said that this company has sold about $10,000,000 preferred stock of the Atchison, Topeka & Santa Fe to Kuhn, Loeb & Co., New York. The annual report for the year ended June 30, 1908, shows $10,000,000 preferred stock of the Atchison in the treasury of the Oregon Short Line (Union Pacific).

WESTERN MARYLAND.—Alvin W. Krech, chairman of the committee of holders of the general lien and convertible bonds, says: "The principal of the general lien and convertible bonds has been declared due and the mortgage foreclosure proceedings are well advanced. It is expected that the plan formulated by the committee will be in final form within the next few days. In view, however, of published rumors, it is considered advisable, in advance of formal announcement of the plan, to state its material features, as at present formulated. It is proposed to effect the reorganization of Western Maryland by the organization of a new company which shall take over the property of the old company subject to its first mortgage and its underlying and divisional bonds.

"The new company to issue in acquisition of the property of the old company:

$10,000,000 4 per cent. non-cumulative preferred stock, convertible into common stock at par and redeemable at the option of the company at par, and
$23,959,560 common stock (of an authorized issue of $60,000,000).

"The holders of certificates of deposit for general lien and convertible 4 per cent. bonds to receive:

(a) For principal, 100 per cent. in new 4 per cent. preferred stock.
(b) For unpaid overdue coupons, including the coupon of October 1, 1909, with interest, 8.36 per cent. in new common stock.

"The $8,274,160 cash required for payment of matured obligations, improvements and betterments will be raised by sale of $20,685,400 of common stock to a bankers' syndicate, who will offer the same as follows:

(a) To the holders of certificates of deposit for $10,000,000 general lien and convertible bonds 50 per cent. of their holdings, *i. e.*, $5,000,000 new stock for 40 per cent. of its par value, or	$2,000,000
(b) To the holders of $15,685,400 common stock, in exchange for their old stock and on payment of 40 per cent. of the par value thereof in cash. 100 per cent. of their holdings, i. e., $15,685,400 new common stock for	6,274,160
	$8,274,160

"The following securities will remain undisturbed:

Western Maryland first mortgage 4s	$42,518,000
Divisional bonds	6,200,000
Leased line bonds	1,659,300
Leased line guaranteed stock outstanding	574,650
Total undisturbed bonds and guaranteed stock	$50,951,950
Since the issue of the $10,000,000 convertible bonds in 1902 under the plan for the union of Western Maryland and West Virginia Central, there has been created for acquisitions of new property and for betterments and improvements temporary obligations amounting to	$7,088,143
During this period there has been expended from income for new property and betterments	1,798,428
There will, in reorganization, be expended for new property and for betterments and improvements an amount probably considerably in excess of	600,000
Making a total sum expended in new property or in betterments and improvements of	$9,486,571

"This amount is nearly 40 per cent. of the $23,959,560 of the new stock proposed to be issued under reorganization, and the increase of common capital stock—from $15,685,400 to $23,959,560—is exactly equal at par to the $8,274,160 cash provided in reorganization. Under the plan of reorganization all obligations issued for the property, betterments and improvements, with the possible exception of $510,000 car trust certificates, will be provided for. The $10,000,000 preferred stock which, in reorganization, replaces the issue of convertible bonds will thus take the original rank of these bonds as junior only to the first and underlying mortgages.

"The property supporting the new preferred stock will be nearly $9,500,000 greater than that supporting the original issue of convertible bonds; and the latter sum thus will have been added to the equity represented by the old common stock—the old common stockholder thus paying for new stock an amount equal only to his increased equity."

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Cuban-American Sugar Co. has ordered two 30-in. gage moguls from the American Locomotive Co.

The Canadian Pacific is building one Pacific locomotive and five freight locomotives at its Angus shops.

The Gulf, Texas & Western has ordered two 2-6-0 freight locomotives from the American Locomotive Company.

O'Brien, Fowler & McDougall, contractors, Ottawa, Ont., have ordered two mogul engines from the Canadian Locomotive Co.

The Denver & Rio Grande has ordered 19 heavy passenger locomotives, eight Mallet locomotives and three switching locomotives.

Corrigan, McKinney & Co. have ordered two six-wheel switchers, cylinders 19 in. x 26 in., from the American Locomotive Co.

The Patagonian Railways are asking bids up to August 21 on 7 locomotives. Address Direccion General de Ferrocarriles, Buenos Ayres, Argentine.

The Publicity League of Cuba advises that Cuban railway companies are in the market for locomotives. Edgar W. Dennison, secretary, 309 National Bank building, Havana.

The Baltimore & Ohio, reported in the *Railroad Age Gazette* of July 9 as being in the market for 60 locomotives, is now asking prices on 30 Atlantic and 35 consolidation locomotives.

The Chicago, Rock Island & Pacific has not ordered the 15 consolidation locomotives reported in the *Railroad Age Gazette* of July 16. The equipment referred to was that of the *St. Louis & San Francisco*, ordered by the same joint management and reported on the same date.

The Denver, Northwestern & Pacific, as reported in the *Railroad Age Gazette* of July 9, has ordered two 0-6-6-0 Mallet articulated compound locomotives from the American Locomotive Co., for delivery in October.

General Dimensions.

Weight on drivers	329,000 lbs.
Total weight	329,000 "
Cylinders, h. p.	21 in. x 32 in.
Cylinders, l. p.	33½ in. x 32 in.
Diameter of drivers	55 in.
Boiler, type	Straight top; radial stay
Boiler, working steam pressure	225 lbs.
Heating surface, tubes	5,031 sq. ft.
" " firebox	206 "
" " total	5,237 "
Tubes, number	409
" outside diameter	2¼ in.
" length	21 ft.
Firebox, type	Wide
" length	9 ft. ⅛-in.
" width	8 " ¼-in.
" material	Steel
Grate area	72.2 sq. ft.
Water capacity	9,000 gals.
Coal capacity	12 tons
Tractive effort	78,400 lbs.

Special Equipment.

Axles	Otis steel
Bell ringer	Little Giant
Boiler lagging	Sectional magnesia
Brakes	Westinghouse-American
Brake-beams	"Creco"
Brake-shoes	American
Couplers	Climax steel
Draft gear	Miner tandem
Driving boxes	Steel
Headlight	Ross special, with Pyle electric equipment
Injector	Nathan Simplex non-lifting
Journal bearings	Magnus metal
Piston and valve-rod packings	Paxton Mitchell
Safety valve	¾-in. Ashton
Sanding device	Leach
Sight-feed lubricators	Nathan four-feed bull's-eye
Springs	Railway-Steel Spring Co.
Staying	Tennessee bloom iron
Steam gages	Ashton
Ties	Latrobe O. H. steel
Tubes	Worth Bros., charcoal iron
Valve gear	Walschaerts
Wheel centers	Steel

The Canadian Pacific, as reported in the *Railroad Age Gazette* of June 25, ordered one switching locomotive from its Angus shops. This locomotive will be of the 8-wheel coupled type, for use in gravity yard switching. It will weigh 185,000 lbs., will have cylinders 22½ in. x 28 in., drivers 52 in. in diameter and a coal capacity of 10 tons.

CAR BUILDING.

The Chicago & North Western is in the market for 1,500 steel underframe gondolas.

The Milwaukee Electric Railway & Light Co., Milwaukee, Wis., is in the market for 100 city cars.

The Colorado & Southern is said to be in the market for 4 passenger coaches. This item is not confirmed.

The Northern Pacific is said to have ordered 200 box cars from the Seattle Car Co. This item is not confirmed.

The Philippine Railways, through J. G. White & Co., New York, are asking prices on 10 thirty-ton box and 15 thirty-ton flat cars.

The Gulf, Texas & Western is asking prices on two 100 box, 20 stock, 20 coal, 20 cabooses, 6 coaches, 2 combination and 2 baggage cars.

The Southern Pacific is said to be in the market for 116 large electric cars for operation on its Oakland and Alameda lines. This item is not confirmed.

The Chesapeake & Ohio is said to have ordered 200 cars in addition to the 1,000 mentioned in the *Railroad Age Gazette* of July 16. This item is unconfirmed.

The Publicity League of Cuba advises that Cuban railways are in the market for cars. Edgar W. Dennison, secretary, 309 National Bank building, Havana, Cuba.

The Pennsylvania will build or purchase between 250 and 300 steel passenger cars during this year. These cars will be additional to those which are now under order or construction.

The Canadian Northern has ordered 100 steel underframe flat cars from the Dominion Car & Foundry Co.; 15 cabooses from the Crossen Car Manufacturing Co., and three sleeping cars from the Barney & Smith Car Co.

The Alabama Great Southern, reported in the *Railroad Age Gazette* of July 16 as having ordered 10 passenger coaches from the Pullman Company, has also ordered 3 steel underframe mail cars and 2 steel underframe baggage cars from the same company.

The Canadian Pacific has ordered 102 box cars, one box-baggage car, five freight refrigerator cars, one stock car and 15 flat cars from its Angus shops, one van from its Farnham shops, and 125 steel flat cars and three steel coal cars from the Dominion Car & Foundry Co.

The Buffalo, Rochester & Pittsburgh, reported in the *Railroad Age Gazette* of July 16 as being in the market for 1,000 forty-ton box cars and 1,000 fifty-ton steel hopper cars, has ordered 500 of the box cars from the American Car & Foundry Co. and 500 from the Standard Steel Car Co., and the 1,000 steel hopper cars from the Cambria Steel Co.

The Denver & Rio Grande has ordered 1,600 fifty-ton steel dump bottom coal cars, 1,500 steel under and upper frame box cars, 500 steel under and upper frame stock cars, 250 steel 50-ton flat cars and 200 refrigerator cars. This road has under construction 10 all-steel passenger coaches, 10 all-steel baggage and express cars and a few caboose cars.

The Baltimore & Ohio, reported in the *Railroad Age Gazette* of July 2 and July 9 as being in the market for passenger and freight equipment, is now asking prices on 2,000 steel-end, self-clearing coke cars, 1,000 crop-end gondola cars, 1,000 box cars, 500 ventilated box cars, 500 refrigerator cars, 5 parlor-cafe cars, 45 vestibule passenger cars and 20 passenger-baggage, baggage and postal cars.

The Atchison, Topeka & Santa Fe has ordered 41 baggage cars from the American Car & Foundry Co. The special equipment is the same as that specified for the nine cars noted in the *Railroad Age Gazette* of May 14. The current reports of big passenger equipment orders are premature. Up to date only the baggage cars mentioned above and the six coaches noted in our issue of July 9 have been ordered.

The Atlantic Coast Line, reported in the *Railroad Age Gazette* of July 2 as asking prices on 500 thirty-ton and 25 forty-ton freight cars, has ordered 500 double felt-lined ventilated 30-ton box cars from the Barney & Smith Car Co., and 25 forty-ton hopper bottom phosphate cars from the Pressed Steel Car Co. The box cars will weigh 39,000 lbs. and will be 36 ft. long, 8 ft. 6 in. wide and 7 ft. 5 in. high, inside measurements; 37 ft. 9¼ in. long, 9 ft. 10 in. wide, 12 ft. 10¼ in. high, over all. The bodies will be of wood with steel end framing and the under frames will be of steel. The phosphate cars will weigh 45,000 lbs. and will be 31 ft. 9½ in. long and 8 ft. 8 in. wide, inside measurements; 40 ft. 10 in. long, 10 ft. 2½ in. wide, 12 ft. 9 in. high, over all. The bodies will be of wood, with steel framing, and the underframes will be of steel. The following special equipment is common to all cars:

Brakes	Westinghouse automatic
Brake-beams	Pennsylvania deck
Brasses	A. C. L. standard
Couplers	Tower, steel
Door fastenings	National
Draft gear	Farlow-Westinghouse
Dust guards	Harrison
Journal boxes	National Malleable Castings Co.
Paint	A. C. L. standard
Roofs	Murphy outside metal, Type XL
Side bearings	A. C. L. adjustable
Springs	A. C. L. standard
Trucks	A. C. L. standard
Wheels	33-in. cast iron

The box cars will have structural steel body and truck bolsters, and solid and ventilated doors; and the phosphate cars will have pressed steel body bolsters and cast steel truck bolsters.

IRON AND STEEL.

The Baltimore & Ohio is reported in the market for 1,800 tons of bridge steel.

The St. Louis Southwestern is reported in the market for 2,000 tons of bridge steel.

The Boston & Maine has ordered 10,000 tons of rails from the Maryland Steel Company.

The Centerville Light & Traction Co., Centerville, Iowa, is in the market for 800 tons of 70-lb. rails.

The Chicago, Milwaukee & St. Paul is said to have ordered 15,000 tons of rails from the Illinois Steel Co.

The Chicago & Oak Park Elevated Railway has ordered 460 tons of Bessemer rails from the Illinois Steel Co.

The Grand Trunk has let the contract to the American Bridge Company for 1,500 tons of bridge work for its Indiana lines.

The Publicity League of Cuba advises that Cuban railways are in the market for rails. Edgar W. Dennison, secretary, 309 National Bank building, Havana.

General Conditions in Steel.—There continues to be evidence of the fact that the steel mills are overcrowded with orders, due to the recent activity in buying. Some of the independent plants are said to have their capacities sold for from three to six months to come. This condition has led to an advance in prices where early delivery is specified and consumers, in many cases, have withdrawn from the market, pending assurance that the price improvements will be maintained. The United States Steel Corporation is said to be working at 92 per cent. of present capacity, which rate is greater than the total 1908 capacity. It is said that one company operating all its open hearth capacity cannot produce billets sufficient to supply its finishing mills.

RAILROAD STRUCTURES.

ABERDEEN, S. DAK.—The Chicago & North Western has plans made for a brick passenger station to cost about $75,000.

ABERDEEN, WASH.—The Gray's Harbor Railway & Light Co., Aberdeen, Wash., is building a new machine shop.

AMARILLO, TEX.—The Chicago, Rock Island & Gulf has let contracts for four passenger stations between Amarillo and Tucumcari.

BIRMINGHAM, ALA.—See Atlanta, Birmingham & Atlantic under Railroad Construction.

BROWNWOOD, TEX.—The Gulf, Colorado & Santa Fe has let the contract for a $35,000 station.

CARSON CITY, COLO.—The Denver & Rio Grande is said to have let the contract for a brick passenger station.

COCHRANE, ONT.—According to press reports, a union passenger station is to be put up at Cochrane jointly by the Temiskaming & Northern Ontario and the Grand Trunk Pacific.

COLLEGE, TEX.—The Houston & Texas Central will build a station at College.

COLORADO SPRINGS, COLO.—According to press reports, the Atchison, Topeka & Santa Fe has begun work on improvements, including concrete conduits over Shooks Run, and at a later time will begin work on a 50-ft. subway at the intersection of Pikes Peak avenue, with its tracks on El Paso street.

CROCKETT, TEX.—Plans are said to have been made for a combined passenger and freight station to be built by the International & Great Northern. The building is to be of brick construction 150 ft. 1½ in. x 32 ft. 9 in., with a large end platform. (July 9, p. 83.)

DILLON, MONT.—See Idaho Falls, Idaho.

ELLENSBURG, WASH.—The Chicago, Milwaukee & Puget Sound is constructing a one-story passenger station.

FAYETTE, MISS.—The Yazoo & Mississippi Valley will build a station. No contract will be let as the work is to be carried out by company forces.

FRESNO, CAL.—The Atchison, Topeka & Santa Fe has authorized an addition to the passenger station, to cost $11,500, and the construction of a brick veneer station at Stillwater, Okla., to cost $11,000.

GALVESTON, TEX.—The Galveston causeway, for which the contract was let July 5, as mentioned in the *Railroad Age Gazette* of July 9, is to cost $1,329,400, according to the contract. The A. M. Blodgett Construction Co., Kansas City, Mo., will build the roadway and concrete arch bridge, their bid being $1,232,000. The Penn Bridge Co., Beaver Falls, Pa., will build the Class B Scherzer rolling lift bridge at a contract price of $94,400, and put in an interlocking system at $3,000. About $100,000 is to be paid for the present one-track structure and the engineering and legal fees will help swell the total cost to almost $1,500,000.

IDAHO FALLS, IDAHO.—An officer of the Oregon Short Line writes that the following improvements are under way: New yard tracks, passenger station, freight house, etc., at Idaho Falls, Idaho, estimated cost $236,265; new passenger station at Yellowstone, Mont., estimated cost $30,000; new passenger and freight station at Minidoka, Idaho, estimated cost $20,486; a new oil house to cost $30,000, and a new store house to cost $47,074 at Pocatello, Idaho; new depot at Dillon, Mont., to cost $24,244.

JAMESTOWN, N. DAK.—The Northern Pacific will rebuild its roundhouse, which was destroyed by fire last May.

MILWAUKEE, WIS.—An officer of the Chicago & North Western writes that the contract recently let to Hase & Weiher, of Milwaukee, is for the depression of streets at Kinnickinnic avenue, Becher street, Lincoln avenue and Chicago avenue, in Milwaukee, where the company is elevating its tracks. The work consists of the excavation and depression of streets and the building of paving, curbs and concrete sidewalks. (July 16, p. 129.)

MINIDOKA, IDAHO.—See Idaho Falls, Idaho.

MONTREAL, QUE.—Plans have been submitted by the Canadian Pacific to the railway commission for a 950-ft. subway, 70 ft. wide, with 17-ft. clearance, to be constructed under the Canadian Pacific tracks in St. Louis. It is asked that the cost be apportioned between the town of St. Louis, the Canadian Pacific and the street railway. The estimated total cost of the improvements is about $200,000.

NEENAH, WIS.—An officer of the Chicago & North Western

writes that the contract recently let to the O'Keefe & Orbison Construction Co., Appleton, Wis., was for cylinder piers for bridges over Lake Beaut des Morte and Fox river at Neenah. The work consists of the sinking of about 150 eight-ft. cylinder piers filled with concrete. These cylinders are to support plate girder spans 46 ft. long. The total length of bridge work involved is about 2,700 ft. (July 16, p. 129.)

New York.—The New York Central & Hudson River has plans made for putting up a new passenger station, to replace the present Mott Haven station. An officer writes it is doubtful if the work will be started this year.

Omaha, Neb.—The Chicago, Burlington & Quincy is preparing plans for a new freight house. Preliminary to the construction of the building a retaining wall has been built and the necessary grading done.

Ottawa, Ont.—See article under General News on Grand Trunk station and hotel at Ottawa.

Philadelphia, Pa.—See Philadelphia & Reading, under Railroad Construction.

Pocatello, Idaho.—See Idaho Falls, Idaho.

Portland, Me.—An officer of the Maine Central is quoted as saying that the Boston & Maine and the Maine Central, joint owners of the union station, have plans made for reconstructing the station. The improvements to be made include increasing the size of the train shed and constructing a subway from the railway square to reach each track within the shed without crossing the tracks.

Portland, Ore.—The Portland Railway, Light & Power Co. is planning extensive additions to its plant. A steam relay plant and a hydro-electric generating station are included.

Sacramento, Cal.—An officer of the Southern Pacific writes that plans for a new steel bridge over the Sacramento river are being prepared although work probably will not begin this year. The new bridge will eliminate a very sharp curve which is at present necessary to reach the station. It is expected the work will cost about $500,000.

The Western Pacific is preparing plans for new shops estimated to cost about $700,000.

San Angelo, Tex.—An officer of the Gulf, Colorado & Santa Fe writes that the company will put up a six-stall brick engine house, to have a concrete pit and composition roof, at San Angelo. The estimated cost is $18,000. (July 9, p. 83.)

Scranton, Pa.—An officer of the Delaware, Lackawanna & Western writes that bids were opened recently for putting up a 52-ft. x 425-ft. freight station at Scranton, Pa., to cost about $50,000. The foundations are to be of concrete, with brick walls, steel roof trusses, with concrete roof slabs and concrete floor slabs. The second story is to be 111 ft. long and is to be used for offices. (July 16, p. 129.)

Somerville, Tex.—An officer of the Gulf, Colorado & Santa Fe writes that the company will put up a 10-stall brick engine house with a concrete pit and composition roof at Somerville. The estimated cost is $28,000. (July 9, p. 83.)

Stillwater, Okla.—See Fresno, Cal.

Tacoma, Wash.—The Tacoma Eastern is moving its station and repairing it extensively for joint use with the Chicago, Milwaukee & Puget Sound until the new depot to be built by the latter road is ready.

An ordinance has been passed by the City Council granting the Milwaukee Terminal Company permission to lay its industrial tracks on the tide lands. An ordinance is now under consideration to authorize the Oregon & Washington to build an overhead crossing or viaduct from the north portal of the long tunnel to the terminal ground on the tide lands.

Temple, Tex.—An officer of the Gulf, Colorado & Santa Fe writes that the new passenger station, for which the contract has just been let, is to be 264 ft. x 45½ ft., two-story brick, with tile roof, electrically lighted and steam heated, and will cost about $75,000. Construction will begin at once.

Wilson, La.—The Yazoo & Mississippi Valley has given a contract for a station to be built at Wilson.

Yellowstone, Mont.—See Idaho Falls, Idaho.

Supply Trade News.

The U. S. Metal & Manufacturing Co., New York, has taken the eastern agency for the Hutchins Car Roofing Co., Detroit, Mich.

The American Locomotive Co., New York, has let the contract for an addition to its Brooks plant, Dunkirk, N. Y., to the American Bridge Co.

Through a typographical error in the obituary notice of John Herbert Eames, in this column last week, the name appeared John Herbert Evans.

The Pittsburgh-Buffalo Co., Pittsburgh, Pa., has ordered 20 seven-ton compressed air locomotives from the H. K. Porter Locomotive Co., Pittsburgh, Pa., for use in its coal mines at Marianna, Pa.

The McKeen Motor Car Co., Omaha, Neb., is endeavoring to double its output of motor cars, the present supply being inadequate. Large orders for machinery have been placed and additional floor space is seriously needed in the erecting department.

Dr. J. E. Widner, who has been connected with the Gould Coupler Co., New York, and the Gould Storage Battery Co., New York, for the past 17 years, will open an office in Chicago as western representative of the Trenton Malleable Iron Works, Trenton, N. J., for the sale of this concern's car doors, hopper bottom doors and gas engines.

The Butler, Pa., works of the Standard Steel Car Co., Pittsburgh, Pa., were tied up for several days last week by a strike which began with the riveters. The men demanded increased wages and a change in the method of collecting rents from them. There was some rioting. The strike was settled on July 20. The company agreed to make a change in the rent collecting, and the strikers consented to have the company follow its usual custom as to the question of increased wages.

The National Malleable Castings Co., Cleveland, Ohio, has bought the property and assets of the Latrobe Steel & Coupler Co., Chicago, and the plant at Melrose Park, Ill., will hereafter be operated by the National company. In addition to making the Sharon, Climax and Tower couplers, it is prepared to furnish the Latrobe, Melrose, Munton and Chicago couplers, also repair parts for them all. The company, through this purchase, now has two large, completely equipped plants for the manufacture of steel couplers at Sharon, Pa., and Melrose Park, Ill.

The Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio, has just received an order from the Great Southern of Spain for a carload of hollow staybolt iron bars, making the second carload order received from this company within the past year. The Great Northern recently specified hollow staybolt iron in five locomotives; the American Railroad of Porto Rico in three locomotives, being built by the Baldwin Locomotive Works; the Ann Arbor in four, and the Detroit, Toledo & Ironton in eight locomotives recently ordered from the American Locomotive Co. During the past six months fully 50 new railway customers have been secured for Falls hollow staybolt iron in the United States, Canada and Mexico. The company has also received new business from railways in many foreign countries.

The business of the Westinghouse companies during June maintained the same steady rate of advance already noted during the previous months of the present year, indicating, before the close of 1909, a repetition of the busy times of 1907. The Westinghouse Air Brake Co., Wilmerding, Pa., has received a large number of orders for brake apparatus and friction draft gear. The Union Switch & Signal Co., Swissvale, Pa., is now employing about twice as many men as a year ago. The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., showed in June an improvement of 25 per cent over the business of May. A large order for railway motors was secured from the New York Elevated lines of the Interborough Rapid Transit. Switchboards and auxiliary supplies, amounting to about $500,000, have been ordered for the New York terminals and tunnels of the Pennsylvania Railroad. The Philadelphia

Rapid Transit Co. recently ordered two steam turbine equipments, of 6,000 and 12,000 kilowatts capacity, respectively, from the Westinghouse Machine Co.

Charles R. Crane, first vice-president of the Crane Company, Chicago, has accepted the position of Minister to China, and the Chinese government has announced that the appointment is satisfactory to it. Mr. Crane is the eldest son of R. T. Crane, president and founder of the Crane Company. He was educated in the public schools of Chicago, and, after graduating, began work in his father's company. He began at the bottom, in the shops, and worked up until he became first vice-president in 1894, being given charge of the foreign business of the company. He has traveled widely since that time, particularly in Russia and China. The appointment of Mr. Crane is in line with the policy of the state department to try to get more commercial opportunities in China for this country, and Mr. Crane, as a manufacturer who has particular knowledge of conditions in China, was therefore selected. It is expected that he will take up his duties within a few weeks.

The workmen at the McKee's Rocks, Pa., plant of the Pressed Steel Car Co., Pittsburgh, Pa., struck last week. The strikers complained that under the piece-work system they were not getting as much as they earned. They also alleged that they had to pay money for their jobs. The company says that the last allegation is absolutely untrue. Under the piece-work system, it says, the poorest laborers became dissatisfied and several hundred of these were discharged on July 12 and 13 because they refused to work. On July 14 the rest of the men struck. Rioting began at once, and for several days there was fighting between the strikers and the sheriff's forces and state constabulary. The Pittsburgh Defence Association tried to induce the company not to try to run the mills at present, hoping thus to prevent violence. Failing in this the association asked for an injunction restraining the company from opening the mills, but on July 20 the injunction was refused on the ground that the court had no jurisdiction. There was less rioting during the first part of the current week, and as we go to press the Pressed Steel Car Co. says that the situation is improving slowly. There is no rioting and no demonstration on the part of the strikers. It says that sentiment is turning in favor of the company and strikers are gradually coming back to work. More men were at work on July 21 than at any time since the beginning of the strike. The men who were discharged last week will not be taken back.

TRADE PUBLICATIONS.

Gas Fuel.—Tate-Jones & Co., Inc., Pittsburgh, Pa., have issued circular No. 124, containing ready reference tables for users of natural gas as a fuel.

Rails.—The American Bureau of Inspection and Tests, Chicago, has just issued a pamphlet embodying various specifications for steel rails. This booklet has been issued for general distribution.

Hand Cars.—The Buda Foundry & Manufacturing Co., Chicago, is mailing a wall calendar containing a large halftone showing a business section of Chicago, with a Buda hand car flying over it like an air ship.

Water Glass Guard.—The American Steam Gage & Valve Manufacturing Co., Boston, Mass., has just issued two circulars covering its water glass guards. The pamphlets contain illustrations and general descriptive matter.

Chicago & Northwestern.—The company is distributing a small folder giving passenger train schedules between Chicago and 12 summer resorts, and another giving three routes to Lake Geneva, with a large map of the lake and adjacent territory.

Denver & Rio Grande.—A "panoramic folder" has been issued which contains a series of pictures in color of scenes on the route from Denver to Salt Lake City arranged in proper order. The reverse side of the folder contains a comprehensive description of these and other scenic attractions.

Train Lighting.—The Willard Storage Battery Co., Cleveland, Ohio, has just issued a new catalogue on train lighting batteries, covering all of the standard types of train lighting batteries. It is said that at the present time there are 65,000 of these cells in use on railways of the United States and Canada.

Northern Pacific.—A 32-page booklet has been published on the objects, membership, program, etc., of the Seventeenth National Irrigation Congress to be held in Spokane, Wash., August 9 to 14 inclusive. The illustrations are numerous and show points of interest in Spokane, as well as the effects of irrigation in the Northwest.

Batteries.—The Electric Storage Battery Co., Philadelphia, Pa., has just issued a booklet giving a sketch of the development of the Exide and Hycap-Exide batteries. The booklet contains a short history of the development of the storage battery plate and special reference to the application of batteries to electrically propelled vehicles.

Motors.—The Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., has issued a small booklet describing the application of its line of small motors for office and shop services. The following are some of the uses to which these motors are applied: Motor-driven adding machine, mailing machine, eraser, envelope sealer, vacuum cleaner, buffing and polishing wheel, etc.

Great Northern.—The company's publication on the Flathead, Coeur d'Alene and Spokane Indian Reservations gives full information as to how, when and where to register for land in the reservation, with the rules governing homestead rights, and a 30-page illustrated booklet gives a description of the agricultural resources of the new country. The company has also published booklets on the "Scenic Northwest" and "Fishing in the Skykomish." The former gives facts concerning the cities of the Northwest and pictures of striking scenery along the company's line, and the latter contains numerous stories of big fish in the Washington rivers with photographs to back up the statements in the text.

Detroit Return Trap System.

The American Blower Co., Detroit, Mich., began the installation of return trap systems for automatically returning the condensation from its hot blast heating and ventilating systems and its ABC moist air dry kilns in the early history of return trap installation.

The principle is simple and extremely economical, and is suitable for general application to all classes of installation, as it is claimed to have no undesirable features such as noisy operation, improper valve construction, too little leverage for actuating the valves, and other minor defects in design.

The return trap is a device which receives the water of condensation from whatever source, and automatically delivers it into the boiler at practically the temperature due to the pressure at which the

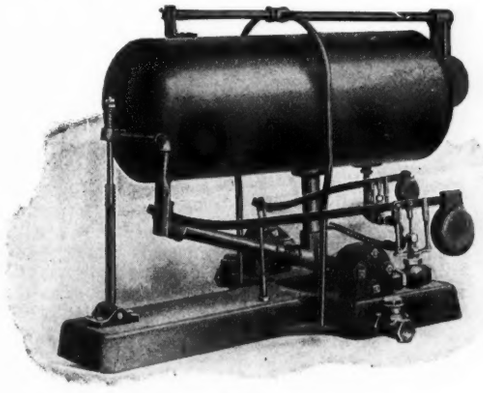


Fig. 1.

steam is condensed. Condensation must be removed. The quicker it is removed, the drier and more effective will be the heating surfaces. It is pure water and hot and it is gross extravagance to waste it. The most effective way to utilize the heat it contains is to deliver it into the boiler before it vaporizes.

A Detroit return trap (Fig. 1) will deliver water at a high temperature much more satisfactorily than a pump. An ordinary duplex boiler feed pump requires from 90 to 120 lbs. of steam per horse-power. A return trap consumes less than 10 lbs. per horse-power. The pressure is admitted to the surface of the water, and it is automatically shut off before the tank is empty. The steam used is only

such as is condensed by the latent heat passing from it into the water in the tank, which is all put back into the boiler.

When the steam pressure carried on the heating system is 10 to 15 lbs. or more, it is only necessary to employ one return trap and receiver. All the return from whatever source is brought into the receiver A (Fig. 2). For every pound of steam carried on the system, water can be lifted 2 ft. The trap is set level at any convenient point about 4 ft. above the water level of the boiler and as near to it as possible. The water is raised through pipe B and a check valve C into the trap tank, which normally stands in a horizontal position. As the tank becomes filled with water, the tank tilts over, engaging with a lever which automatically turns live steam from the dome of the boiler onto the surface of the water in the tank, thereby equalizing the pressure within the boiler. The water is thus allowed to flow

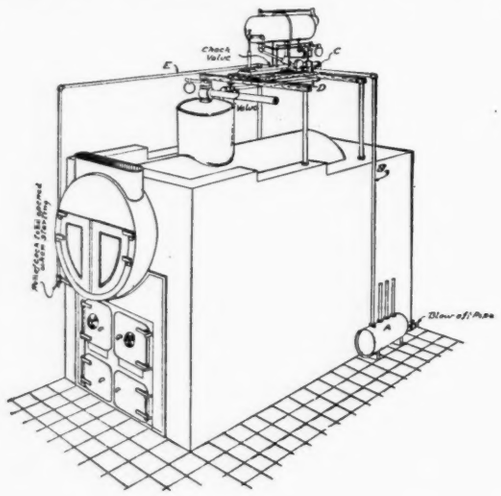


Fig. 2.

directly into the boiler by gravity. As the trap tank becomes empty, it is tilted back into its normal position by a weighted arm, and the process of refilling and dumping is repeated.

In manufacturing plants where exhaust steam is used for heating and drying, all the returns can be brought into a receiver and trap, where all the lines will be drained by gravity. The trap below is then employed as a water lift to the trap above the boiler. With this double-trap system no other means of boiler feeding is necessary.

Manufacturing plants using part of their exhaust for heating buildings and part for feed water heating in open feed water heaters, allow of an ideal adaptation of return traps used as water lifts. In one plant in Detroit where condensation collects in widely separated places, five return traps are employed to put the condensation back into an open feed water heater. The condensation could not return by gravity to the boiler room, and the multiple return trap system does not necessitate any pumping in order to get the pure hot water back to the feed water heater.

Detroit traps are well adapted to draining live or exhaust steam headers; on systems carrying a vacuum, traps specially arranged for vacuum work are a unique, practical and economical machine.

Western Electric Exhibit at Detroit.

An interesting feature of the convention of the Superintendents of Telegraph, held in Detroit Mich., June 22-25, was the exhibit of train despatching telephones of the Western Electric Co., Chicago. The systems were in actual operation and represented the latest development in telephone train despatching equipment. Two types of selector equipment were shown: the Cummings-Wray standard, with a sender and four stations, and the Gill, in two types, the individual call and the high-speed multiple call, one sender and four stations of each.

Other apparatus developed especially for railway use included transmitters, receivers, desk stands, transmitter arms, head telephones, keys, loud-speaking receivers, portable sets, line poles, hand sets, foot switches, test panels, protectors, dry batteries, sliding telephones, extension bells and hand generators. Any of this equipment shown could be used with either the Gill or Cummings-Wray despatching systems. There were also telegraph keys, emergency cable, cords, opposite sets and howlers. The exhibit of transmitter arms included several distinct types, each having special features. Those shown were the Van Akin, the W. E. Special, the Flexiphone, the No. 1020 and the No. 20 desk stand.

The convention days fell in the midst of the late June hot wave. Western Electric fans were placed in the company's exhibit booth and similar fans were placed in the convention room. The Western Electric Co. also distributed trade-mark paper weights which were unique in design.

Representing the company at the convention were W. E. Harkness, R. F. Spamer and H. L. Burns, of New York, and C. L. Howk and J. H. Finley, of Chicago.

Characteristics of Dry Cells.*

It seems impossible to entirely avoid deterioration of dry cells, due to internal action between the contained chemicals while the cells are not in use. A large number of ingredients are used, and in practice it is impossible to have them chemically pure. This explains almost entirely why dry cells are never without some degree of internal action producing harmful effects. Efforts to reduce this "shelf" action to the lowest practical minimum have met with varying degrees of success. The most obvious expedient is to make the cells absolutely dry and supply moisture when they are put into service. This plan, however, has its serious drawbacks.

As to the number of watt-hours available under various service conditions, the rate of discharge must not be too high, for the cell will not have time to properly recuperate or depolarize when the open circuit interval occurs. If the rate of discharge is too low, there is a tendency for the cell to use itself up internally. Tests indicate that if the energy is drawn out under ordinary working conditions at such a rate that the cell is exhausted in a period of about a month, the maximum energy is obtained. If the work is such that the time during which the cell is in service is extended over a year,

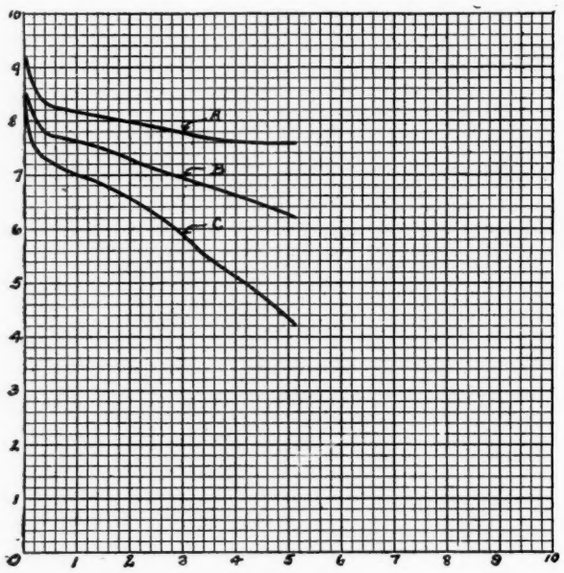


Fig. 1.

the percentage of the maximum amount of energy available is considerably reduced. This fact is to be accounted for by the longer period during which internal chemical action producing no current is going on. It is not to be understood from this that a cell may not be depended upon for long periods of service. It simply means that a reduced watt-hour output (which in itself may be more than sufficient for requirements), is to be expected.

There is an increase of chemical action at high temperatures and a decrease at low temperatures. When not in use, a cell will deteriorate more slowly at low temperatures. Cells stored in a dry atmosphere where the temperature is kept below the frezing point of water will probably show no appreciable deterioration, whereas at 100 deg. F., or above, the effect of harmful action will be noted in a comparatively short period. Where cells are on light service, requiring only a small energy drain, it follows that the ratio of useless chemical action producing flow of current will be low at low temperatures and high at high temperatures. Where the rate of energy drain is high, then the temperature is not of so much importance, because the time during which harmful action can take place is greatly reduced.

The internal resistance of cells does not seem to be materially affected by wide temperature variations. The internal resistance of wet cells in general is fairly constant, while that of dry cells is constantly varying. When a dry cell is new, its internal resistance may be approximately one twentieth of an ohm, and it increases from this up into the hundreds of ohms. The magnitude of the internal resistance of the dry cell determines the age it has reached in its period of useful life.

I am showing on the chart two sets of curves which bring out strongly this factor of internal resistance. The test conditions were

*From a paper read by F. H. Loveridge, battery expert, Western Electric Co., Chicago, before the convention of the Superintendents of Telegraph at Detroit, Mich.

the closure of the circuit at certain intervals through an external resistance for a period of time which remained constant throughout the test. In the first set there is a high rate of energy discharge, and in the second a low rate. The ordinates of these curves are expressed in volts and the abscissas in time. The three curve in each set marked A, B and C represent, respectively, the E. M. F. on open circuit, the potential difference at the time of closure of the circuit through an external resistance and the potential difference at the end of each period. It will be seen from these curves that at the start the potential difference at the beginning of closed circuit and the potential difference at the end of the period are practically the same. The E. M. F. curve is somewhat higher. As the cell is used, these curves diverge. The high E. M. F. on open circuit is of no particular value, because it indicates a condition where no work can be done. The instantaneous drop when the circuit is closed shows the magnitude of the internal resistance when the current starts to flow.

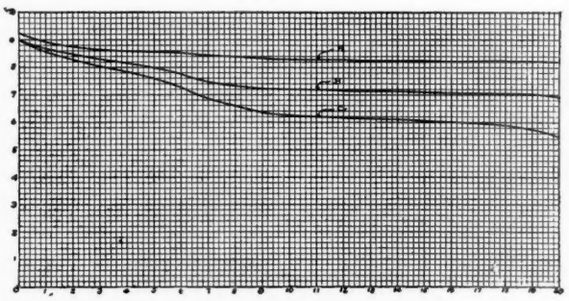


Fig. 2.

The difference between the potential at the beginning of the period of closed circuit and the potential at the end indicates the extent of the increase of internal resistance, or the "practical polarization." These curves give a very correct idea of the characteristics of the dry cell, and from them may be deduced most of the data which should lead to the proper use under service conditions.

There is no reason why cells should not be left in circuit as long as they contribute an E. M. F. to the current flowing, but if the potential of individual cells is allowed to drop to a very considerable extent it will be necessary to correspondingly increase the total number in series so that the required potential for working conditions may be maintained.

The determination of the point at which cells should be taken out is something that must depend on the particular service condition. If in telegraph work there is a permissible variation in the current from 90 down to 60 mil-amperes the average potential per cell

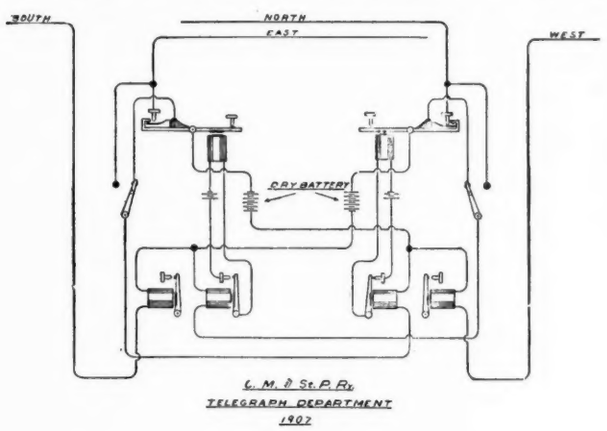


Fig. 3.

could drop from 1.5 volts to 1 volt. When this point is reached the entire set must be replaced unless additions are made to the series.

Thus, cells can be run down to lower averages and more of the total energy utilized. If, however, this plan is carried too far and cells are left in circuit until they reach the zero point, they become resistances which simply increase the circuit resistance as though additional lengths of wire were inserted, additional work being thrown on the remaining cells. I believe the best practice is to set some potential difference at which the cells are to be taken out of circuit, thus preventing the number in series from becoming excessive.

If enough cells to do the work are placed in a circuit, a larger number is objectionable, because too heavy a flow of current is produced, the flow of current in the circuit tending only to draw energy from the cells at an excessive rate. Where dry cells are used in circuits of widely varying resistance, this fact points to the desirability of determining the necessary E. M. F. for each circuit and connecting the proper number of cells in series to give the required flow of current.

For telegraph and block signal work it has been found by experience that where dry cells are installed as a unit—that is, a certain number in series which are all put in and taken out together—it is highly desirable to have cells uniform in quality and condition. One defective or run-down cell among fresh ones will drag the others down so that the set is unfit for service before the fresh cells have given out their normal amount.

The use of dry cells in multiple is sometimes of advantage where the current drains are heavy and frequent. It may be that two sets of cells in multiple will work more than twice as long as either set by itself. A similar arrangement to meet similar conditions is to connect sets so that by means of a switch one set alone may be put in circuit at a time, thus giving the other set or sets time to recuperate.

Cells should be put into service as fresh as possible. If renewals are to be required after a certain period, it is best to get fresh cells from the maker, rather than to order a large stock and keep them on hand for use when needed. The number of cells kept in stock should be made as small as possible.

Cells either in storage or service should also be protected from moisture, because short circuits may occur from the cartons, or paper boxes, becoming saturated and forming conducting paths between the external surfaces of adjacent cells. They should also be protected from dust and dirt, because conducting particles may form accidental short circuits.

Dry cells are liable to damage from rough handling. If the wax used for sealing is cracked or broken it tends to hasten the drying out of the interior. The resistance between the zinc cup and its lining may be so increased as to become a serious defect if the cell is subjected to pounding, and there is also increased harmful chemical action.

My experience with battery gages is that they are not very reliable and that their usefulness is confined practically to detecting cells which have reached such a condition that they should no longer be left in service. In the first place, their accuracy is no greater than should be expected where the price they bring is taken into consideration. Then, again, the method of making contact with cell terminals causes the readings to be exceedingly variable. The position of the instrument and vibration are also factors which affect the readings. However, when a certain gage is used by an individual exclusively, he soon gets to understand the readings and can interpret them so as to obtain the best estimate of the condition of the cell which it is possible to obtain from the reading of the instrument. In looking for "defectives" among new cells, the battery gage test is much to be preferred to the method sometimes used of short circuiting cells through a wire on which an ordinary compass is placed and judging their condition by the magnitude of the deflection. A test of this nature is not only a heavy drain on the cell, but the ratio between current flowing and deflection is not constant.

The best way to test cells in service is to allow the current to flow through its circuit under standard conditions and then to apply a high resistance voltmeter of good construction, noting the potential difference at the terminals of individual cells. By this method each cell will show what it is doing under regular working conditions. For testing new cells, a high resistance voltmeter is desirable in order to see if the E. M. F. is up to normal; the instantaneous current flowing through a low resistance ammeter will give a good indication of the internal resistance. However, it does not always follow that the cell which will give the best service has the lowest internal resistance.

The question is often asked as to the quality of new cells of various makes or of various lots of the same make, as determined by instrument readings. It is impossible to answer intelligently with only limited data to go by. The only satisfactory determination is to give cells a closely observed service test and from results form conclusions. Cells must have time to show their staying qualities, and these cannot be demonstrated in a moment. It is possible to make cells that will give remarkably good initial readings but which have no staying qualities, and the reverse is also true.

Mr. Fry has made a valuable investigation of actual conditions found in railway telegraph and block signal work. His data shows that the average time of circuit closure is less than five minutes per day. This is reckoned on a basis of 10 minutes total of telegraphing per day. As the open and closed fractions are respectively 5/9 and 4/9, the total closed period will not be over five minutes. On this basis the watt-hours per cell per day would be 0.0078, or, for a year, 2.847, on the assumption that the average voltage per cell is 1.25. Such an energy drain is very light and represents only a small portion of what could be obtained under ordinarily favorable conditions.

In the operation of telephones, the conditions are more severe. It is, of course, necessary for current to flow during the entire time of speaking into the transmitter, and though the transmitter resistance is constantly varying it cannot be said to approach open circuit, as in telegraph transmission. With high resistance transmitters a minimum of 140 mil-amperes is required, and it may go as high as 320.

With transmitters adapted for some railway work, which have a lower resistance, a current not less than 300 nor more than 600 mil-amperes would be used—we would say roughly that 500 would be about the average working strength. I have no data as to the length of time per day during which a telephone would be used, but the magnitude of current flow and its continuity indicate the severe condition of battery drain.

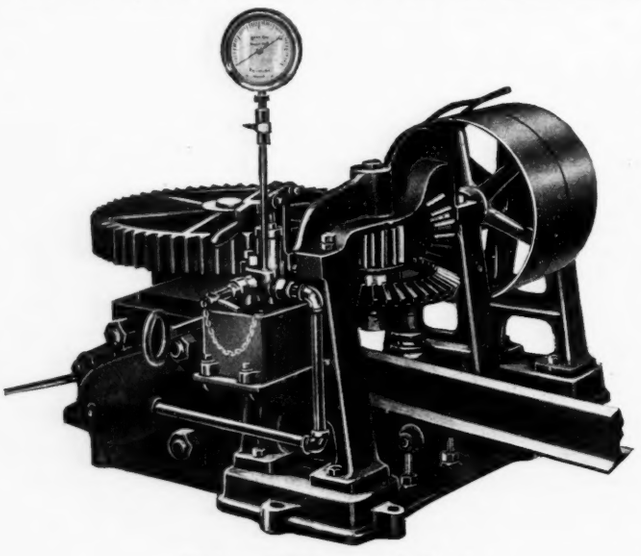
With the majority of telephone equipments for train despatching now being recommended, a key is associated with the transmitter and so arranged that when the user wishes to talk to the distant party, or, in other words, when the transmitter is in use, the key is depressed, thus closing the battery circuit. During the period when the distant party is talking, the button is released, thus opening the local transmitter circuit and saving the cells from a current drain during the time it is not required. A device of this kind is also of benefit from a transmission standpoint, for the reason that if the cells are given intermittent service during conversation they will have a chance to recover during the intervals of open circuit and will maintain a more nearly constant voltage on the transmitter.

I am indebted to Mr. Fry for a circuit diagram showing a very ingenious arrangement of dry cells used with a telegraph repeater. The arrangement is such that the current requirement of the dry cell is reduced to a minimum and the current energy is used to the best advantage. From the diagram it will be seen that only the set of dry cells on the receiving side is in service and that here the current flows only during the "space" or "open" period of the sending line. As the sending and receiving functions are alternated, it will readily be understood from the diagram how the two sets of cells are alternately brought into action, thus carrying the reduction of closed circuit periods to its limit.

The numerous advantages of the dry cell for open circuit work are now being appreciated. The wet cell formerly used in telephone service has disappeared, and with its exit has gone a source of annoyance and expense. The possibility of having a certain quantity of electrical energy in a form requiring no attention for maintenance, giving out its energy as demanded and so cheap that it may be thrown away when no longer useful, is almost ideal. As time goes on, the field of application will constantly widen until all requirements for a small amount of electrical energy used intermittently over a long period will be taken care of by the dry cell.

Power Rail Bender.

The use of power in bending large numbers of rails effects a considerable saving of time in doing this work. With an ordinary hydraulic bender, two men will bend, say, forty 30-ft. 90-lb. rails in a day, and six men with the best of screw benders, it is claimed, cannot do the same work on more than 20 rails per day. The power bender shown in the illustration, made by the Watson-Stillman Co., New York, when once adjusted is claimed to bend such rails at the rate of



Watson-Stillman Rail Bender.

about one per minute and is suitable for rails of any section. It has been used a great deal on construction work, since in addition to having great capacity the machine can be loaded on a car and taken out into the field. As shown, a 15-h.p. motor is employed for driving. Where electric power is not available, the machine is furnished with belt drive. In either instance, there is little manual labor required, and the solidity of the heavy cast-steel base insures a regularity of curvature not so easily obtained with a hand-operated bender.

The power-driven bender roll is mounted in a frame which is forced forward by any pressure up to 50 tons as required to give the desired curvature. This pressure is obtained from a hydraulic cylinder receiving its power in turn from a small hand pump mounted on the frame. The two fixed roll centers are 34 in. apart. A set of bending rolls, three for A. S. C. E. standard and six for other sections, is required for each shape of rail to be bent.

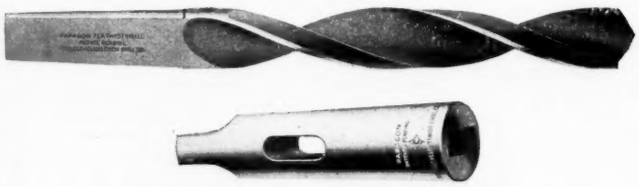
The other bending rolls are changed by loosening set screws and pulling out the pins. The ram holding the middle bending roll can be worked in and out by a lever without the aid of the pump, if the release valve is open. The pump is therefore necessary only when the ram is under load.

The work of bending is facilitated by providing roller runways to support the ends of the rail as it passes through the machine. For this purpose the Watson-Stillman screw jack rolls will be found convenient, as they permit adjustment to the correct height when set on uneven ground.

Cleveland Twist Drill and Socket.

The accompanying illustrations show a paragon flat taper shank high speed drill and a paragon socket, made by the Cleveland Twist Drill Co., Cleveland, Ohio.

The drill is twisted from flat stock, with a shank forged and ground to size from the original bar, there being no weld or joint. This shank has a uniformed taper on the flat side as well as on the rounded edges. The attractive feature of the shank lies in its strength and simplicity. A regular taper shank sleeve outside, with a flat taper

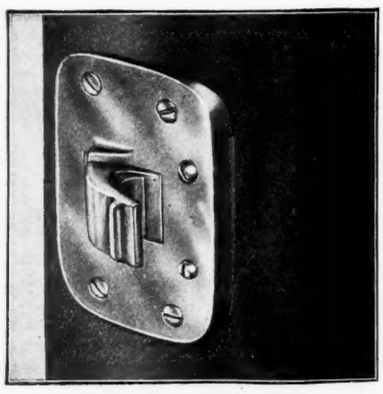


Paragon Flat Taper Shank High Speed Drill and Socket.

hole inside to correspond to the shank, is all that is required to hold the drill. A good true fit is said to be thus secured, resulting in a firm accurate drive with the strain distributed over the entire length of the shank. An ordinary drift easily removes the drill. The sockets are simple and inexpensive and are furnished in either rough, fitted or sleeve styles.

Summers Automatic Vestibule Curtain Hook.

The Summers automatic vestibule curtain hook was described in *The Railway Age*, June 12, 1907. In the two years since it was brought out it has been put on the passenger equipment of a large number of roads, including the New York, New Haven & Hartford, the Pittsburgh & Lake Erie, the Chicago, Milwaukee & St. Paul, the Central of Georgia, the New Orleans & Northeastern, the Seaboard Air Line, the Vicksburg, Shreveport & Pacific, the Alabama Great Southern, and the Atlanta & West Point. It has also been specified for 91 cars recently ordered by the Southern. In addition to these, several other roads have the device in trial service and their reports indicate that it is giving satisfaction.



Summers Vestibule Curtain Hook.

The appearance of the hook is shown by the accompanying illustration. It is made of brass and is pivoted inside a brass face plate. The shoe at the bottom of the hook recess is made of forged steel, and it is against this that the curtain handle bears. If the cars are separated while the curtain is hooked, the latter will unroll to its full length and when it reaches this point the sudden pull on the steel saddle releases the hook and frees the curtain handle. This makes the device automatic, this first pull of the curtain, upon separation of the cars, giving full release, obviating all danger of damage to the curtain and its fixtures. It was stated in the previous article that estimates at that time placed the damage from this source on Pullman equipment alone at $25,000 a year.

The Summers hook is one of the specialties of the Planet Company, First National Bank building, Chicago.